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ARTICLE

Clinical effect of computed guided pudendal nerve block for patients with premature ejaculation: a pilot study

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ABSTRACT

Background: Premature ejaculation has a complex etiology, and its pathophysiology is still unclear, with penile hypersensitivity being the most accepted hypothesis. The aim was to investigate the efficacy and safety of a computed tomography-guided pudendal nerve block at the level of the sacrospinous ligament and the Alcock's canal in patients with premature ejaculation refractory to conventional pharmacological treatment.

Methods: This is a prospective pilot study involving five patients suffering from premature ejaculation refractory to standard treatment and clinical features of pudendal nerve entrapment. A CT-guided infiltration of ropivacaine and methylprednisone was done at the levels of sacrospinous ligament and Alcock's canal. Intra-vaginal ejaculatory latency time (IELT) was recorded several times for each patient before and after infiltration. International Index of Erectile Function (IIEF-5), Premature Ejaculation Diagnostic Tool (PEDT) and Sexual Quality of Life–Male version (SQoL-M) questionnaire were also evaluated before and after infiltration.

Results: Overall IELT differed significantly before and after treatment (21.94 vs 215.42 s; $p = 0.039$). IIEF-5, PEDT and SQoL-M also differed significantly before and after treatment. No complications for the CT-guided infiltration were recorded.

Conclusion: CT-guided pudendal nerve block at the sacrospinous ligament and the Alcock's canal was effective in improving premature ejaculation. Therefore, pudendal nerve entrapment may be a curable cause of sensory premature ejaculation.

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Introduction

Premature ejaculation is the most common sexual dysfunction encountered in men, with a worldwide prevalence of ~ 20% [1]. It is defined as ejaculation that always or nearly always occurs before or within approximately 1 min of vaginal penetration and can be classified as lifelong or acquired [1,2].

The etiology of premature ejaculation is complex, and its pathophysiology is still unclear. One of the most accepted hypotheses is penile hypersensitivity and hyperexcitability [3]. Several treatment options relay on this hypothesis and provide positive results. Topical anesthetic agents delayed ejaculatory latency times in several well-conducted studies by decreasing the sensitivity of the penile glans [4]. This has led the European Association of Urology to recommend the use of topical anesthetic agents for the treatment of premature ejaculation [5]. The relationship between penile sensitivity and ejaculatory latency time is also supported by dorsal penile nerve block [3] or pulsed radiofrequency neuromodulation [6] trials. Many clinical trials have shown an increase in ejaculatory latency to a certain extent using the abovementioned two modalities. Another support of the penile hypersensitivity hypothesis comes from Asian countries where selective dorsal neurectomy is a common practice and yields satisfactory results [7]. However, topical anesthetic agents, dorsal penile nerve block or neuromodulation and selective dorsal neurectomy can cause erectile dysfunction and other sexual dysfunction, limiting their use in clinical practice.

The normal ejaculation reflex comprises two distinct sequential phases: emission and expulsion [8,9]. The first reflex, triggered by stimulation of the penile glans and skin, uses pudendal sensory nerve fibers, which provide information to the sacral cord and cerebral sensory cortex. The descending pathway arrives at the emission center in the thoracic, lumbar cord and, from there, sympathetic fibers produce the seminal emission. The second reflex is triggered by the urethral proprioceptive sensation of the seminal emission and is completed by activation of the efferent somatic pudendal fibers to the brain cortex and perineal muscles [8,9].

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Computed tomography-guided pudendal nerve block and laparoscopic pudendal nerve release are common practice in our department. We witnessed, a posteriori, the improvement of premature ejaculation in several patients treated for pudendal nerve entrapment. The aim of this prospective study was to investigate the efficacy and safety of a computed tomography-guided pudendal nerve block at the level of the sacrospinous ligament and the Alcock's canal in patients with premature ejaculation refractory to conventional pharmacological treatment and pudendal nerve entrapment. To our knowledge, this treatment modality has not been reported previously.

Materials and methods

Trial design

This is a prospective pilot study which includes five patients suffering premature ejaculation and clinical features of pudendal nerve entrapment, recruited consecutively.

Patients

From January 2018 till September 2019, we prospectively enrolled five consecutive patients with a history of premature ejaculation, defined according to The International Society for Sexual Medicine (ISSM) [10] as '1 – ejaculation which always or nearly always occurs prior to or within about one minute of vaginal penetration; and, 2 – inability to delay ejaculation on all or nearly all vaginal penetrations; and, 3 – negative personal consequences, such as distress, bother, frustration, and/or the avoidance of sexual intimacy'.

Patients were included if they (i) were men aged 18–45 years, (ii) had a score >16 in the 5-item version of the International Index of Erectile Function (IIEF-5) [11], (iii) were sexually active more than once per week with stable female partners in the last 3 months, (iv) had a score ≥ 11 in the Premature Ejaculation Diagnostic Tool (PEDT) [12], (v) had minimal or no response to recommended conventional pharmacologic treatment (selective serotonin reuptake inhibitors, topical anesthetic agents) and psychological/behavioral management, and were off treatment for the last 3 months, and (vi) agreed to participate in our study. We should note that patients had had some symptoms or clinical features of pudendal nerve entrapment (e.g. allodynia or hyperpathia, rectal foreign body sensation, urinary frequency and/or pain on a full bladder, etc.) but did not have all the essential criteria of the Nantes criteria [13]. These symptoms will not be discussed in the present study. Patients with thyroid problem, diabetes mellitus, neurological disease, extensive alcohol use, or the use of any medication known to cause sexual dysfunction were excluded from the study. Patients with iodine contrast allergy were also excluded. The study was conducted in accordance with the Declaration of Helsinki and all patients gave their written informed consent after approval of the study by the local Medical Ethical Committee.

Before the procedure of pudendal nerve block, we recorded the patients' age, body mass index and the time since onset of the disease, which were assessed by asking each patient. The patients were instructed to fill out the IIEF-5, PEDT and the Sexual Quality of Life–Male version (SQoL-M) [14]. An intra-vaginal ejaculatory latency time (IELT), which is the time between the start of vaginal penetration and the start of intra-vaginal ejaculation [15], was measured, using a stopwatch, for every patient ten times over 6 weeks before the computed guided pudendal nerve block. The geometric mean IELT was calculated for each patient.

The procedure

Under sterile conditions, a 22-gauge needle was first inserted under computed tomography guidance, the patient being in the procubitus position, to the level of the sacrospinous ligament (Figure 1). An injection of 0.3 ml of isotonic iodine contrast solution was performed demonstrating the extravascular topography of the needle tip followed by an injection of 2.5 ml of Ropivacaine (7.5 mg/ml) and 1 ml of Methylprednisolone (40 mg/ml). The procedure was repeated at the level of Alcock's canal as well. Patients were allowed to have sexual intercourse in the 6 h following the pudendal nerve block then 1 or 2 times per week for 6 weeks.

IELT were measured in the same manner at each sexual intercourse, for ten times, 6 weeks after the pudendal nerve block and a geometric mean IELT was calculated for each patient. The IIEF-5, PEDT and SQoL-M were also recorded 6 weeks after the procedure. The safety and tolerability of the procedure were recorded prospectively.

Statistics

First, the geometric means of the ten IELT values recorded for each patient before and after the procedure were assessed. Then, the overall mean ± standard deviation and median, minimum and maximum of IELT were obtained before and after the procedure. The means of IIEF-5, PEDT and SQoL-M ± standard deviations and medians, minima and maxima were also calculated. The distribution of each variable used was checked for departure from normality assumptions using Kolmogorov–Smirnov test, Shapiro–Wilk test and visual inspection by Quantile–Quantile plots. In order to compare IELT, IIEF-5, PEDT and SQoL-M before and after treatment, paired *t*-test (in cases of normal distribution) and Wilcoxon signed rank test (in cases of non-normal distribution) were used. A p-value < 0.05 was considered statistically significant.

Results

Five consecutive patients (age $= 27 \pm 6$ years; BMI $= 23 \pm 3$ kg/m^2) were prospectively enrolled. Three patients had lifelong premature ejaculation and two patients had acquired premature ejaculation. The means, standard deviations, medians, minima and maxima of each score before and after pudendal nerve block are presented in Table 1. The geometric means of IELT differed significantly before and after treatment for each patient ($p < 0.001$) (Figure 2) and the overall

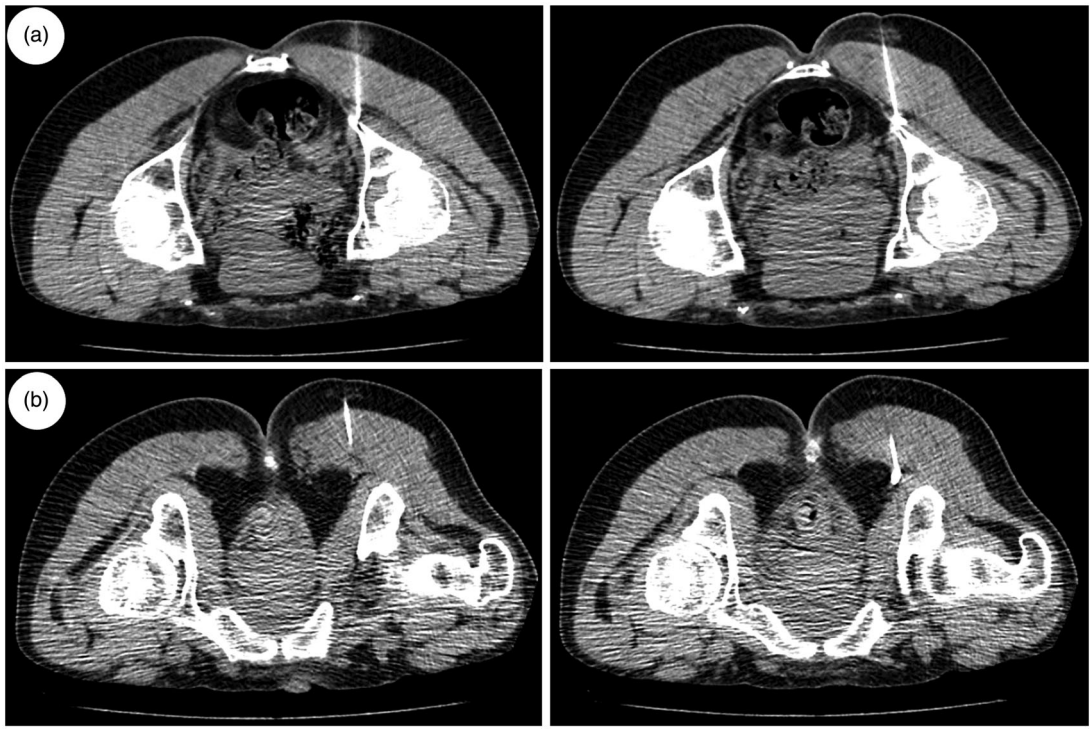

Figure 1. 22-gauge needle inserted under computed tomography guidance: (a) at the level of the sacrospinous ligament and (b) at the level of Alcock's canal.

Table 1. Means, standard deviations, medians, minima and maxima of IELT, IIEF-5, PEDT and SQoL-M scores, before and after pudendal nerve block.

Score	Mean	SD	Median	Minimum	Maximum	*p*-value
IELT						
Before	21.9	13.8	16.8	10.1	43.7	<0.001
After	215.4	80.6	204.1	136.3	315.3	
IIEF-5						
Before	20.4	1.7	20.0	19.0	23.0	0.009
After	22.2	1.1	22.0	21.0	24.0	
PEDT						
Before	14.8	3.0	13.0	13.0	20.0	0.042
After	5.0	2.5	5.0	2.0	8.0	
SQOL-M						
Before	38.2	8.0	43.0	29.0	46.0	0.004
After	57.4	5.6	59.0	51.0	63.0	

IELT (mean of geometric means) of all patients also differed significantly, respectively, before and after treatment (21.94 vs 215.42 s; $p = 0.039$) (Figure 2). The IIEF-5 score differed significantly, respectively, before and after treatment (20.4 vs 22.2; $p = 0.009$). The PEDT differed significantly, respectively, before and after treatment (14.8 vs 5.0; $p = 0.042$). The SQoL-M differed significantly, respectively, before and after treatment (38.2 vs 57.4; $p = 0.004$). The procedure was safe and well tolerated in all patients and no complications were recorded in the 6-week trial interval.

Discussion

The etiology of premature ejaculation is complex, and its pathophysiology is still unclear. Recent research has focused on abnormal organic factors that are initially present (e.g. hyperexcitability of the glans) and secondarily aggravated by psychological ones [16].

Our findings showed that significant improvements in the IELT, PEDT and SQoL-M scores were achieved after computed tomography (CT)-guided pudendal nerve block. Thus, CT-guided pudendal nerve block at the sacrospinous ligament and the Alcock's canal was effective in improving premature ejaculation by prolonging significantly the IELT. Male satisfaction during intercourse was also significantly improved and this was reflected by the improvement of the fifth question of the IIEF-5 score ('When you attempted sexual intercourse, how often was it satisfactory to you?') which was translated into an improvement also in the overall IIEF-5 score. The procedure was also safe and well tolerated by the patients.

Associations in the literature exist between pudendal nerve entrapment and many sexual disorders such as erectile dysfunction [17], genitalia numbness [17] and persistent genital arousal disorder [18]. The authors propose that lifelong or acquired premature ejaculation can also be a clinical symptom caused by a painless pudendal nerve entrapment and can be improved by treating this syndrome.

Anatomically, the pudendal nerve is a branch of the sacral plexus [19–21]. It emerges from the S2, S3 and S4 roots, then departs the pelvis from the greater sciatic foramen along with the sciatic roots, between the sacrospinal and the sacrotuberous ligament, and re-enters the pelvis via the lesser sciatic foramen [19–21]. At this level, it releases a superior hemorroidal branch and then cruises through a duplication of the obturator muscle's fascia called 'Alcock's canal'. The pudendal nerve gives rise at the exit of Alcock's canal to three main branches which are the inferior rectal branch, the perineal branch and the dorsal sensory nerve of the penis or clitoris [19–21]. The pudendal nerve entrapment consists of a compression of this nerve especially between sacrospinous and sacrotuberous ligaments (which constitutes the most common level of entrapment) or in Alcock's canal [19–21].

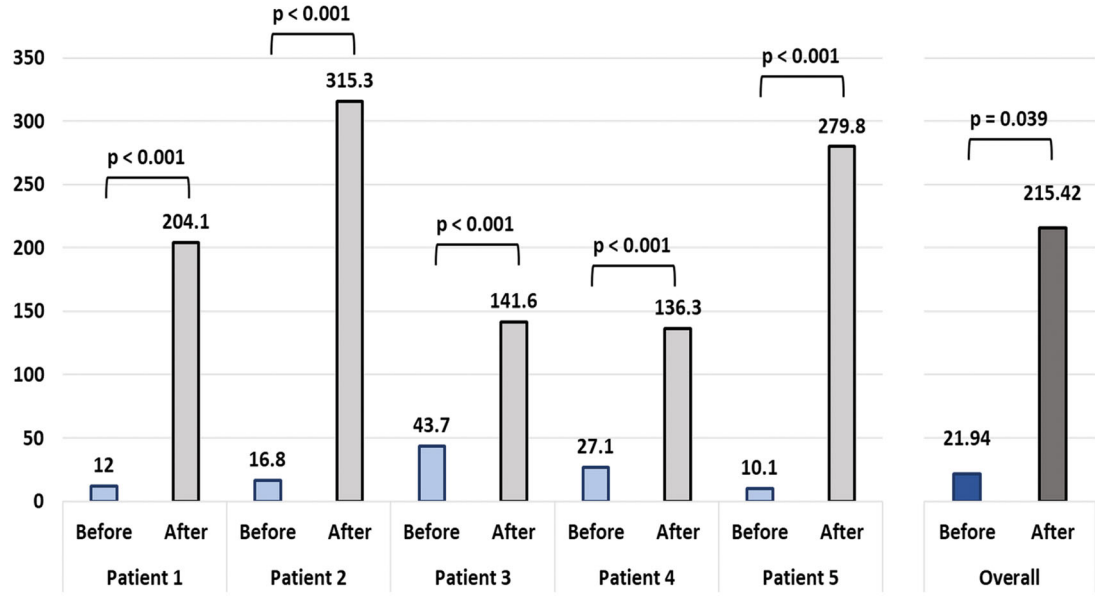

Figure 2. IELT differences for each patient, as well as overall IELT difference for all patients, before and after pudendal nerve block.

Pudendal nerve entrapment is diagnosed clinically *via* the presence or absence of Nantes criteria [13]. However, these criteria seem to be limited mainly to neuralgia (i.e. pain in the pudendal somatosensory skin territory), along with some complementary findings including hyperpathia, allodynia, numbness and sympathalgia [13]. They do not take into consideration other symptoms that were demonstrated in the literature to be explained by pudendal nerve entrapment such as urinary frequency and urgency, painful bladder symptoms, dyspareunia, erectile dysfunction, etc. [22,23]. Consequently, PNE can lead to a broad spectrum of clinical signs and symptoms that outstrip the classical Nantes criteria, even without the presence of pelvic pain.

The authors think that inflammation of the pudendal nerve resulting from PNE could mimic or lead to a hyperesthesia of the glans, which is innervated by the dorsal nerve of the penis and therefore could lead to a premature ejaculation via a neurologic overstimulation of the ejaculatory center. This meets the principle of hyperexcitability of the dorsal penile nerve branches applied for instance in topical anesthetics, dorsal penile block and elective microscopic resection or cryoneurolysis of dorsal penile nerves done by Zhou et al. [24] and Mirkin et al. [25] which seem to be effective for premature ejaculation. The dorsal penile nerve being a terminal branch of the pudendal nerve, the main problem could be more proximal, due to an inflammation of the pudendal nerve itself in its main entrapment locations. Consequently, treatment should maybe directly target the initial lesion and not its distal pathway, preventing erectile dysfunction resulting from the abovementioned techniques.

Patients in this pilot study underwent CT-guided pudendal nerve infiltration with corticosteroids and local anesthetics and showed a successful recovery of their premature ejaculation. CT-guided infiltration ensures correct needle placement at the site of passage of the pudendal nerve near the ischial spine and at the entry level to Alcock's canal [26]. The patients' response was observed after 6 weeks. This could not be explained only by local anesthetics which have a minimal temporary effect. Corticosteroids might have diminished the pudendal nerve inflammation due to its entrapment between the sacrotuberous and sacrospinous ligaments and/or in the Alcock's canal and therefore improved the patients' symptoms. This seems promising in the fact that surgical decompression would be beneficial in the case of recurrence of symptoms.

Patients in this study experienced improvement of their symptoms and clinical features of pudendal nerve entrapment along with the improvement of premature ejaculation. Future studies should evaluate the role of pudendal nerve block for premature ejaculation in patients even with the absence of symptoms or clinical features of pudendal nerve entrapment syndrome.

We acknowledge several limitations to our study. First, it is a small cohort study; the aim is to generate a hypothesis to be tested in large cohort studies. Second it lacks a control arm. All patients were refractory to all the available therapies with no success. However, this is only a pilot study that requires further investigation and more sophisticated clinical trials. Moreover, our findings cannot be generalized to the population because all these patients suffered from pudendal nerve entrapment. However, pudendal nerve entrapment is an underdiagnosed syndrome and clinicians should ask patients and search for pudendal nerve entrapment symptoms in cases of premature ejaculation.

Pudendal nerve entrapment is a potential curable cause of sensory premature ejaculation. Pudendal nerve block is a safe and well tolerated procedure, associated with increased IELT in patients suffering from premature ejaculation and pudendal nerve entrapment. This should be tested in a large cohort of patients in future trials.

Author contributions

Conceptualization: F. Aoun, F. Absil and R. Bollens. Methodology: F. Aoun, F. Absil and R. Bollens. Formal analysis: F. Aoun, G. Mjaess and J. Assaf. Investigation: F. Aoun, A. K. Chemaly, T. Younane, and R. Bollens. Writing – Original draft: F. Aoun and G. Mjaess. Writing – Review and editing: F. Aoun, G. Mjaess, J. Assaf, A. K. Chemaly, S. Albisinni and T. Roumeguère.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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