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TOPIC PAPER

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Ejaculatory disorders: epidemiology and current approaches to definition, classification and subtyping

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Abstract Ejaculatory disorders (disorders of emission, ejaculation and orgasm) are the most frequent sexual complaint. Conventional algorithms on ejaculatory disorders are based on an organic or psychogenic dichotomy, with the latter being traditionally considered the main etiological cause. The scope of this review is to propose a new classification of ejaculatory disorders, with special emphasis on epidemiology and subtyping of the most frequent: premature ejaculation (PE). There is growing agreement on definition, diagnosis, and treatment options. In many cases, ejaculatory disorders can be classified by psycho-neuro-uro-endocrine symptoms. Epidemiological data, new classifications and subtyping, together with new diagnostic procedures and the availability of pharmacological aids, place this topic in the mainframe of sexual medicine. This will soon demolish the barriers to seeking help perceived by patients suffering ejaculatory disorders.

Keywords Premature ejaculation · Delayed ejaculation · Retrograde ejaculation · Anorgasmia · Medical sexology

Introduction

When sexology began as a science, impotence and ejaculatory disorders were exclusively considered as psychological disorders. However, recent pharmacological and pathophysiological discoveries in sexual medicine have made it clear that organic causes or comorbidities can be found in the great majority of cases of male erectile dysfunction and ejaculatory disorders [1].

The ability to control the timing of sexual pleasure (ejaculation) is for many couples a prime aspect of sexual pleasure. Ejaculation occurring sooner or later than desired can lead to other sexual disturbances, such as erectile dysfunction, hypoactive sexual desire, sexual aversion and female anorgasmia [2]. On the basis of sexual anamnesis, the various disorders are relatively easy to differentiate. Notes on andrological and sexological history should always include information about the ability to ejaculate, frequency of nocturnal emission, and the ability to experience orgasm. As sexual health must now be considered an essential part of individual health, as advised by the World Health Organisation, knowledge of the taxonomy of ejaculation disorders is the basis for the various treatment options currently available.

At the end of the sexual act, three distinct physiological events, emission, ejaculation, and orgasm, normally develop in the male [3]. Each of these functions may malfunction, leading to a sexual symptom with heavy relational consequences (Table 1). Retrograde ejaculation (RE) regards the emission phase, premature, delayed and absent ejaculation are symptoms of the ejaculatory phase and male anorgasmia affects the possibility of enjoying a full orgasmic experience. As these three functions share many aspects of their neurological control and are coordinated events, they have been grouped as "ejaculatory disorders" [4]. However, their epidemiology (Fig. 1), etiology, pathogenesis, taxonomies, diagnosis, and therapies are different.

Disorders of emission

Emission is the coordinated contraction of smooth muscle cells of the male genital tract involving testicular

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Table 1 Taxonomy of ejaculatory disorders

A	Emission phase disorders		
	1	Retrograde ejaculation	
B	Ejaculation phase disorders		
	1	Premature ejaculation	
	2	Deficient ejaculation	
		a	Delayed ejaculation
		b	Anejaculation
C	Orgasm disorders		
	1	Anorgasmia	
	2	Postorgasmic illness syndrome	

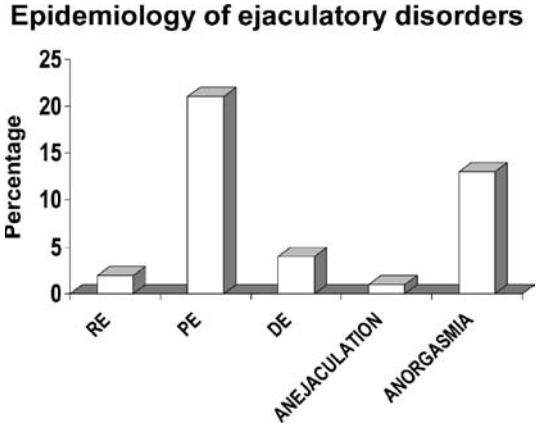

Fig. 1 The epidemiology of ejaculatory disorders. Homogenous data on the prevalence of ejaculatory disorders do not exist. Data were obtained from different sources and are not comparable. *RE* (retrogade ejaculation), data on infertile men; *PE* (premature ejaculation), *DE* (delayed ejaculation), anejaculation and anorgasmia are referred to the general population

tubules, efferent ducts, epididymis, and vasa deferentia and the secretion of seminal fluid due to rhythmic contractions of the seminal vesicles and prostate. The normal emission process is dependent upon the anatomical and functional integrity of the urinary bladder neck and posterior urethra. Closure of the urethral sphincter prevents retrograde flow of semen to the bladder and directs the flow forward.

Any anatomical, traumatic, neurogenic, or drug-induced interference with the integrity of the internal sphincter of the urethra may favor RE, the symptom related to the emission phase. A decrease in emission may be due to ineffective peristaltic contractions of the vas deferens, epididymis and prostate. Patients may complain of normal or less intense ejaculation or orgasm with no ejaculate [5]. Retrograde, or dry, ejaculation occurs when there is a sensation of orgasm and contraction of the ischeo- and bulbo-cavernosus muscles at the basis of the penis, but no semen is ejaculated. This is due to an incomplete closure of the bladder's internal sphincter leading to back ejaculation into the bladder (retrograde). Patients may complain of a dry ejaculation followed by "white urine" when voiding [6]. RE should be suspected in men with absent ejaculate or an ejaculate of less than 1 ml. Diagnosis is confirmed by the detection of substantial numbers of sperm in the urine after ejaculation.

RE can be classified as congenital, acquired or idiopathic. Various anatomic and congenital anomalies can occasionally cause RE [7]. Diabetic autonomic neuropathy may lead to problems with emission and ejaculation [8]. The true incidence of RE is difficult to estimate. It ranges from 0.3 to 2% of patients attending fertility clinics [9], but may be as high as 18% in men with azoospermia [10]. Diminished or retrograde ejaculation, as well as anejaculation, may occur in up to a third of male subjects with diabetes [11]. Retrograde ejaculation is more frequently associated with damage to the innervation of the internal urethral sphincter during prostatectomy or following retroperitoneal lymph node dissection [12]. When a drug-induced dry ejaculation occurs, there is usually no sperm in the urine. RE has often been reported in association with antipsychotics [13, 14].

Disorders of ejaculation

Ejaculation is properly defined as the expulsion of semen from the urethra. It is a reflex response in which the serotoninergic system at the hypothalamic level acts as a suppressor of the ejaculatory reflex [15]. In fact, both serotonin reuptake inhibitors and serotonin agonists determine the extension of ejaculatory latency [16, 17].

Premature ejaculation

Only after reliable contraceptives became available, the sexual and feminist revolution of the mid 1960s, and the "discovery" of the female orgasm, did PE become important in the cohort of symptoms connected with male sexual performance. Previously, as sex was considered almost exclusively only as the means for reproduction, ejaculation before a given time was not thought of as pathological. In fact, Kinsey rejected the notion that PE is a sexual dysfunction when, in his historic survey on human sexuality, he found that 75% of men ejaculated within 2 min of penetration [18].

Definition

There is no commonly accepted definition of PE [19]. Depending on the study, any ejaculation occurring within 1 min [20], 2 min [21], 3 min [22], or even 7 min of penetration [23] has been considered as premature. Others specify the number of penile thrusts, considering from 8–15 thrusts as a criterion for PE [24]. Both of these approaches are easily quantifiable and objective, but the rationale for the time of penetration or the number of strokes used as diagnostic criterion has never

been offered. Other authors considered partner satisfaction: Masters and Johnson suggested that a man experienced PE if he was unable to delay his ejaculation until his partner was sexually satisfied in at least 50% of their coital connections [25]. As most women take longer to reach orgasm than men, the majority of men are therefore ''precocious''. Furthermore, this definition does not take PE in homosexual couples into account, it defines an individual pathology on the basis of the sexual responsiveness of the partner, and the 50% figure chosen by the authors appears to be arbitrary.

PE has been more recently considered as the persistent or recurrent inability to voluntarily delay ejaculation [26, 27] upon or shortly after penetration or with minimal sexual stimulation or as ''an ejaculation occurring sooner than desired, either before or shortly after penetration, causing distress to either one or both partner'' [28]. Both of these definitions are substantially subjective in nature, and the latter, using the partner's satisfaction as the parameter, has the same limits as Masters and Johnson's original definition. The comment of the DSM-III-R and later editions is an intelligent reminder of the symptom's clinical characteristics: ''the clinician must take into account factors that affect duration of the excitement phase, such as age, novelty of the sexual partner or situation, and frequency of sexual activity'' [29].

The absence of a clear, popular and widely accepted definition of PE allows a ''patient-dependent'' definition and a ''patient-decided'' diagnosis. This is risky, because diagnosis and possible therapy might be based on solely subjective parameters, which are clearly influenced by culture, religion, policy, society, and media—all aspects far from a medical definition.

To overcome these problems, a simple objective method to define PE was proposed by Waldinger in 1994 [30]. The ''intravaginal ejaculation latency time '' (IELT) is the time from the start of vaginal intromission to the start of intravaginal ejaculation. For research purposes, but also for clinical assessment and therapeutic monitoring, this method could be considered the most objective in an evidence-based sexual medicine [31]. Ejaculation before intromission (*ejaculatio ante portas*) has an IELT rating of 0. However, as determination of the average ejaculation time in the general population has been lacking since Kinsey's survey [18], a clear chronological cut-off is not available, although it is needed to develop a broad consensus on the definition of PE.

Epidemiology

Early ejaculation or PE is a frequent sexual complaint, probably the most common, affecting from 5 to 40% of sexually active men depending on age [32, 33]. It is widespread in adolescents, young adults, and other sexually naive males. For this reason, not all authors agree to classify PE as pathological in youth or during early sexual experiences.

Despite its very high prevalence, PE is not often a reason for medical or sexological consultation. In a recent survey of 447 men attending a London general practitioner, the prevalence of PE was only 3.7% [34]. However, a comparable survey performed by German family physicians reports the more realistic prevalence of 66% [35]. In any case, lack or loss of sexual desire [a poorly defined condition, frequently masking erectile dysfunction (ED) or PE] was a much more frequent cause of seeking medical help. This is due to both cultural reasons and the erroneous belief that effective pharmacological treatments for PE do not exist.

Data from the USA National Health and Social Life Survey reveal a prevalence of 21% for PE in men aged from 18 to 59 [36]. Results of the international survey (Global Study of Sexual Attitudes and Behaviors, GSSAB) investigating attitudes, behaviors, beliefs and satisfaction among 27,500 men and women aged 40–80 years showed that the average prevalence of PE is the same around the world: 21% [37]. However, GSSAB cannot be considered a true epidemiological study. Sex is so greatly characterized by culture and religion that the same word may have totally different meanings in different countries. This study should be used, from an epidemiological point of view, as a poll surveying people's attitudes towards sex and diseases. In addition, its figure of 21% does not reflect the general population of sexually active men. In fact, the survey considers only people in their forties or above, when the incidence of PE is thought to be much lower. When considering young, sexually inexperienced men (18–25 years), the incidence probably increases by between 50 and 75%. It should also be considered that older people are more likely than the young to ask for professional help. Teenagers generally ask only for limited counseling (sexually transmitted diseases, contraception). Sex is always considered, even if incorrectly, to be healthy and normal in the young.

Interestingly, GSSAB shows that PE increases from an incidence of 20% of men in their forties to 30% of those in their sixties. This may be due to greater awareness in maturity, to a relative increase in relational problems (partner's menopause, widowed), or to the higher frequency of ED.

In a selected population of 755 Italian subjects attending an outpatient clinic for sexual dysfunction, PE was confirmed as being age-dependent. Patients reporting PE were younger and showed a higher prevalence of anxiety symptoms when compared to the rest of the sample [38].

The prevalence of PE does not appear geographically homogeneous [39]. This can be explained by considering cultural, religious, and political as well as organic factors. PE is most frequently (29.1%) reported by men in East Asia (China, Indonesia, Japan, Korea, Malaysia). There are cultural reasons for this. In East Asia, the sexual importance of the female orgasm has traditionally been high: this is the region of the Kamasutra and Tantra. Premature ejaculation is also frequently per-

ceived as a great problem where ejaculation is identified in the Yang male vital principle. However, organic evidence can be drawn from the fact that these countries are characterized by a lower frequency of sex (at least one sexual intercourse per week: Japan: 21%, China: 32% vs 74% in Italy). It is well know that low ejaculation frequency can exacerbate PE [40, 41].

In non-European, highly-civilized western countries, such as the USA and Canada, the prevalence of PE is only two points lower (27%). Historical evidence suggests that the reason for this may be that the feminist and sexual revolutions in the 1960s were particularly effective in changing the sexual behavior of these societies.

The lowest prevalence of PE was reported in Middle Eastern/African countries (Algeria, Egypt, Morocco, South Africa, Turkey) (17.3%). In this case too, socio-psychological causes may explain the finding. These are male-dominant societies, where female sexuality is traditionally neglected. For this reason, in the Muslim pre-western societies that are patriarchal, with low female social impact, PE may not be perceived as a disease, but, at least in some cases, as a manifestation of virility.

The European prevalence of PE is in between the two extremes. This is the world's most representative region, demonstrating a good balance between female social requirements, religious beliefs, awareness of sexual dysfunctions, willingness to admit sexual failure, hope of obtaining professional help. No differences in PE prevalence are seen when comparing protestant, northern countries (20.7%) with catholic, southern countries (21.5%). In a study of 110 consecutively enrolled Dutch men with lifelong PE, 80% ejaculated within 30 s, 10% between 30 and 60 s, and 10% ejaculated between 1 and 2 min [42]. Interestingly, these IELTs were independent of age and duration of the relationship. Other, different patient populations need to be investigated with the IELT-stopwatch method to show if there are cultural differences connected with this complaint.

Classification

PE, along with ED, hypoactive sexual desire, or dyspareunia is a symptom rather than a disease. In fact, it occurs as a central (imbalance of serotoninergic neurotransmission [1]) or peripheral (short frenum of prepuce, penile hypersensitivity and reflex hyperexcitability [24, 43, 44, 45]) neurobiological disorder, as an uro-genital pathology [prostatitis: 46, 47, 48, 49], and as a symptom of thyroid hyperfunction [38, 50]. PE is usually classified on the basis of its etiology into organic and psychogenic. Furthermore, important efforts have been performed to further differentiate psychological pathogeneses of sexual symptoms (actual-neurotic, psychoneurotic, psychosomatic, and functional) [51]. However, even if the evidence that the brain and its function is the first sexual organ cannot be denied, in his meritorious work Sachs [52, 53] has argued that the adjective psychogenic, even if commonly used, is overtly inappropriate in the classification of sexual dysfunction. In agreement, we added that, irrespective of the ultimate cause, all sexual dysfunctions are per se stressful and a source of psychological disturbances [4, 54] even if some men and couples can accommodate their sexual problems. All cases of PE are thus or become psychogenic and capable of provoking a psycho-relational imbalance. While it is clear that all behavioral dysfunctions may negatively influence organic processes (psycho-somatic evidence), it is also plain that a disease or a symptom of the body may affect behavior (somato-psychic evidence). Body-mind cross-talk is particularly important in sexual behavior in general, and particularly in ejaculatory control. In sexual medicine, diagnosis should be the search for possible causes of sexual symptoms, in order to provide, when possible, an etiological therapy, but should never respond to the classic dichotomy organic/psychogenic. This dichotomy does not exist in reality. It was created to provide clients for psychosexologists, at a time when sexual medicine was far from its current evidence-based capabilities. It is also dangerous to label a patient as "psychogenic" (=crazy, in his perception). In addition, as there is not yet a test (psychometric, instrumental, biochemical, etc) to demonstrate that a given case of PE is psychogenic in nature, the term "psycho-genic" (=generated by the mind) must be considered simply as a hypothesis. Finally, it cannot be "diagnosed by exclusion", or "by subtraction", as frequently and acritically postulated: in the absence of a clear organic dysfunction, psychogenic dysfunction is inferred. In fact, there is no proof that we know all the physiopathological processes controlling ejaculation.

For all of these reasons, we suggest that PE should be classified as organic (with a known, prevalent physical etiology) or non-organic or, better, idiopathic (with unknown cause). In the latter group, social, cultural, psychological, and relational factors may play a role as a cause or a consequence of the sexual symptom (Table 2). In both forms, PE is always accompanied by profound psychological involvement with a strong emotional and interpersonal impact, which should be taken into account during therapy.

Psychological processes should now be thought of as inextricably bound with the organic ejaculation function and dysfunction processes. This holistic approach allows PE to be considered as a psycho-neuro-uro-endocrine disorder affecting the couple.

Subtyping

In clinically placing a patient with PE, it is essential that the spatiotemporal modalities of the symptom's appearance are identified, as well as its comorbidity with other sexual dysfunctions (Table 2). It is clear that PE is not a unique clinical entity, and it must therefore be subtyped [55]. The simplest way to subclassify PE is to consider whether the symptom begins when a male first becomes sexually active (primary, lifelong), or occurs

Table 2 Taxonomy of premature ejaculation. * Note that the causes can be concauses (or co-morbidities), or, in the case of some psychorelational factors, consequences of PE

A	Cause*		
	1	Organic	
		a	Neurobiological
		b	Urological
		c	Endocrine
		d	Pharmacological
	2	Non-organic (idiopathic)	
		a	Functional (experiences, education)
		b	Constitutive (psychological constitution)
		c	Stress-induced (acute or chronic)
		d	Psychosexual skill deficit
B)	Onset		
	1.	Primary (lifelong)	
	2.	Acquired (after a period of normal ejaculatory control)	
C	Time		
	1	Ante portas (before penetration)	
	2	Intra moenia (during penetration)	
D	Type		
	1	Absolute (irrespective of partners or context, generalized)	
	2	Relative (to a partner or a context, situational)	
E	Co-morbidities		
	1	Simple (in absence of other sexual symptoms)	
	2	Complicated (in presence of other sexual symptoms)	
		a	With erectile dysfunction
		b	Due to erectile dysfunction

after a period of normal ejaculatory control (acquired). PE can be absolute (irrespective of partners or context, generalized) or relative (to a partner and/or context, situational). Ejaculation may take place before penetration (*ante portas*) or suddenly during coitus (*intra moenia*). It can be found in the absence (simple) or presence (complicated) of other sexual symptoms. In the majority of cases, PE is the only complaint presented. However, the possibility of coexistence with other sexual problems should always be investigated. Hypoactive sexual desire may lead to PE, due to an unconscious desire to abbreviate the unwanted penetration. Additionally, reduced time to ejaculation is a common early manifestation of ED, or may occur with an unstable erection due to fluctuation in penile blood flow. In this case, the subject may ejaculate early to hide the weakness of the erection. This possibility should be taken into account when evaluating patients with PE. The lack of ejaculatory control may generate reactive hypoactive sexual desire, as well as impotence due to anxiety arising from poor sexual performance. These complications must be evaluated when subtyping and diagnosing PE. But, it is important to bear in mind that subtyping does not mean diagnosing: acquired, situational PE *ante portas* can be due to organic factors in the same way as primary absolute PE. Sexual anamnesis is important to evaluate the patient, but not to decide his diagnostic label.

Deficient ejaculation

Even though much rarer than PE, the delay in or impossibility of reaching ejaculation and/or orgasm is a clinical symptom which may seriously impair a couple's sexual life. A continuing problem with deficient ejaculation is usually taken personally by the partner, who begins to feel less attractive, sexy, and sexually adequate. Marital stress, sexual dissatisfaction, inhibited sexual desire, and avoidance of sexual contact may result if the symptom is not addressed and remedied.

Ejaculatory insufficiency

Delayed ejaculation (DE), or ejaculatory insufficiency, is an inhibition of the ejaculatory reflex, with absent or reduced seminal emission and impaired ejaculatory contractions, possibly with reduced or absent orgasm. Estimates of DE incidence range from 1–4% of sexually active men. Men with DE may be able to ejaculate with great effort and after a prolonged intercourse (30–45 min), or are unable to ejaculate in some circumstances. The symptom can occur both during intercourse and with manual stimulation in the presence or absence of a partner (relative or absolute DE, respectively). If ejaculation is totally absent, the condition is called male anorgasmia (see above). Even though it has been considered a psychorelational symptom, DE is often associated with drug therapy [56, 57, 58, 59], with infection/inflammation of the prostate and seminal vesicles or with painful ejaculation.

Impotentia ejaculationis

The condition of a man who has never ejaculated through any form of stimulation, such as "wet dreams", masturbation, or coitus (primary or complete anejaculation, or *impotentia ejaculationis*), occurs in 0.14% of the general population, according to Kinsey [18], and in

less than 2% of cases of male infertility [60]. However, in a group of 486 patients with disturbed sexual potency, anejaculation occurred in 15% of cases [61]. These patients originated from differing social and intellectual levels, but a feature common to them all was a strict upbringing. Other psychological factors underlying this condition are poorly defined. In fact, psychosexual counseling and/or psychotherapy are not as effective as in other types of non-organic sexual dysfunction. Anejaculation, in contrast to DE, appears to be mainly caused by organic etiologies: it is usually associated with spinal cord injury, diabetes mellitus, myelitis, or multiple sclerosis, with the first being the most common cause [62]. Approximately 90% of men with a spinal cord injury are in fact unable to ejaculate during sexual intercourse [63]. Iatrogenic causes are retroperitoneal lymph node dissection and the use of certain drugs.

It is important not to confuse the classification of anejaculation with that of RE. In the latter, orgasm is usually present, even if blunted, while anejaculation always coincides with anorgasmia (even if the reverse is not true).

Disorders of orgasm

The subjective, perceptual-cognitive event of pleasure is called orgasm and, in normal conditions, coincides with the moment of ejaculation. Orgasm can also occur without ejaculation, as in prepubertal children [64]. Anorgasmia (*anedonia sexualis* or ejaculatory anesthesia) is the absence of orgasm. It does not imply the absence of ejaculation—orgasm without ejaculation is in fact named *coitus reservatus*. The etiology and taxonomy of anorgasmia are currently unknown [65]. A strong decline in ejaculatory volume is associated with reduced sexual pleasure. Since ejaculate volume is androgen dependent, it decreases with age. For this reason, orgasm experience may be blunted in the elderly, and an increase in the weakness of pelvic floor muscles may be observed. Finally, in rare subjects, orgasm may alter central neurotransmission, provoking a postejaculatory pain syndrome [66] or the postorgasmic illness syndrome characterized by severe fatigue, intense warmth, and a flu-like state, with generalized myalgia [67]. Etiology, pathogenesis and prevalence are unknown, even if the GSSAB account for 13.2% of men ''not reaching orgasm'', a definition that may include DE, anejaculation and anorgasmia [68].

Conclusions

The classic taxonomy used for ejaculatory disorders and almost all other sexual complaints, distinguishing between psychosocial (or psychodynamic) and organic (or medical) causes, has as a corollary that psychological PE or DE should be treated by the psycho-sexologist, while organic forms must be cured by the physician. Not only is division into these mutually exclusive groups inappropriate in most cases, it is also based on inadequate grounds. The consequence is that the most frequent sexual dysfunction, despite the fact that it can be successfully treated with drugs, is currently under-diagnosed and under-treated. However, it is now clear that ejaculatory disorders are symptoms of many physical diseases which need medical diagnosis. Conversely, the use of a ''pill'' without a holistic approach which takes account of both the patient's personal and interpersonal sexual history and the profound impact that medical treatment may have on the couple is reductive and often unsuccessful [69].

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