Received: 17 August 2023 | Revised: 20 December 2023 | Accepted: 24 December 2023

DOI: 10.1002/ccr3.8432

CASE REPORT

Clinical Case Reports Open Access WILEY

Treatment of sexual dysfunction induced by hyperprolactinemia accompanied by reduced luteinizing hormone levels: A case report

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Key Clinical Message

Sexual dysfunction induced by hyperprolactinemia accompanied by reduced luteinizing hormone (LH) is common in anrology clinics. A low dose of bromocriptine is helpful for restoring penile erectile function and libido in patients.

Abstract

Sexual dysfunction is closely related to hormonal disorders, of which prolactin (PRL) and luteinizing hormone (LH) disorders are common. How to treat sexual dysfunction induced by hyperprolactinemia accompanied by reduced LH levels is worth discussing. In this study, we aimed to present the case of a 35-year-old male patient with sexual dysfunction. The treatment process and physical and laboratory examination results were recorded. Before treatment, the PRL and LH levels in this patient were 31.27 ng/mL and 1.62 mIU/mL, respectively. The International Index of Erectile Function-5 (IIEF-5) score was initially 14 points. After regular treatment with low doses of bromocriptine and tadalafil, the hormonal disorder was corrected (PRL: 11.16 ng/mL and LH: 2.28 mIU/mL) and sexual function was recovered (IIEF-5: 23 points). This case report suggested a sufficient exposure to low-dose bromocriptine for such patients. Conversely, the exogenous supplementation of human chorionic gonadotropin may not be appropriate.

KEYWORDS

bromocriptine, erectile function, human chorionic gonadotropin, libido, luteinizing hormone, prolactin, sexual dysfunction, tadalafil

1 | INTRODUCTION

Penile erectile dysfunction (ED) is the most common type of male sexual dysfunction. It involves the persistent inability of the penis to achieve or maintain sufficient hardness to complete satisfactory sexual activity, persisting for the duration of more than 3 months. The incidence of ED in men aged 40 years and older is approximately 40% or higher.[1] The incidence gradually increases with aging, leading to marital discord and psychological changes such as tension, anxiety, and depression. Vasculopathy is the main cause of ED, including

diseases leading to decreased blood flow in the cavernous artery of the penis, such as atherosclerosis, arterial injury, arterial stenosis, and so forth, or penile vein leakage caused by decreased smooth muscle activity in the cavernous sinus of the penis and penile tunica albuginea that hinders the closure of venous return. Neurological diseases, such as brain tumors, Parkinson's disease, spinal cord disease, and lumbar disk disease, and injuries can also lead to ED. Further, peripheral neuropathy such as diabetes, uremia, multiple neuropathy, and so forth; surgery or trauma, such as radical prostatectomy and rectal cancer surgery; as well as pelvic fractures, lumbar compression fractures, and straddle injuries can also cause vascular and nerve damage, leading to ED. Hypogonadism, thyroid diseases, and other conditions can lead to a decrease in blood testosterone levels. Drugs such as antihypertensive drugs, antidepressants, antipsychotics, antiandrogens, and antihistamines can all cause ED by interfering with the hypothalamic–pituitary–gonadal axis.[2,3]

With the improvement in health awareness among people, abnormal blood pressure and blood biochemistry are often detected in a timely manner. Additionally, information such as trauma or surgical history and medication history is easy to obtain through inquiry. On the contrary, with the accelerated pace of modern life, poor daily habits may trigger endocrine disorders, including sex hormones, which are not easily detected. Therefore, testing for sex hormones may be necessary for young patients without a history of surgery, trauma, or medication use. Among sexual hormone abnormalities, hyperprolactinemia (HPRL) is relatively common. HPRL is a syndrome caused by multiple factors, characterized by an elevated serum prolactin (PRL) level and dysfunction of the hypothalamic–pituitary–gonadal axis. The serum PRL of normal adults is generally lower than 20 ng/mL (men) or 25 ng/mL (women).[4] HPRL can lead to symptoms such as amenorrhea, lactation, sparse menstruation, infertility, decreased sexual function, headache, obesity, and so forth. Medication remains the primary treatment of HPRL, supplemented by surgery and radiation therapy, following the principle of individualization. In terms of its etiology, certain drugs can interfere with dopamine synthesis, metabolism, or re-absorption, or block the binding of dopamine with its receptor. Dopamine inhibits PRL secretion. Another common cause is hypothalamic–pituitary diseases, such as pituitary adenomas, which can cause excessive secretion of PRL. In addition, stress conditions, tension, and sleep disorders can also lead to elevated serum PRL levels. Ultimately, PRL inhibits the hypothalamic–pituitary–testicular axis, manifested as decreased sexual function, decreased sperm quality, and infertility in men.[5]

2 | CASE PRESENTATION

2.1 | Background of the case

A 35-year-old married man, who was an office employee with no smoking habit, no recent medication history, and a body mass index of 23.6, complained of a weak erection with reduced sexual desire for several months. The frequency of sexual activity was approximately once a month. The sleep quality was poor due to sexual dysfunction accompanied by anxiety. Morning penile erection was not detected recently. The patient denied recent use of medications and diseases including diabetes, hypertension, and hyperlipidemia. The examination of sexual characteristics of the patient at first visit to hospital revealed no abnormalities in external genital organs. The patient underwent fasting blood sampling before breakfast to check for sex hormones and blood biochemical indicators in a quiet state. The examination showed that the patient had no significant abnormalities in blood biochemical indicators (Figure 1, Table 1). Nocturnal penile tumescence and rigidity (NPTR)–Holter monitoring using RigiScan Plus(GOTOP Inc., USA) showed insufficient effective erection time (maximum: 8 min) and reduced average rigidity in the head (38%) and base of the penis (36%). The International Index of Erectile Function-5 (IIEF-5) questionnaire was used to quantify the patient's erectile function,[6] resulting in a score of 14 points (Table 3). The self-rating anxiety scale (SAS) was used to evaluate whether the patient experienced negative emotions,[7] with a score of 66 points (normal range: 0–49 points).

2.2 | Treatment

On February 6, 2023, the result of the first hormone test was as follows: luteinizing hormone (LH) level 1.62 mIU/mL and PRL level 31.27 ng/mL. Considering reduced LH level might inhibit sexual function, we injected intramuscularly the patient with 2000 units of human chorionic gonadotropin (HCG) once a week, followed by 5 mg tadalafil once a day and 1.25 mg bromocriptine twice a day. The patient informed of an improved sexual desire and erectile function 1 month later. The result of a follow-up sexual hormone test revealed the following: LH level 1.14 mIU/mL and PRL level 18.62 ng/mL. Considering the symptoms were relieved, we maintained this treatment protocol, only changed the use of bromocriptine to 1.25 mg once a day, and stopped taking bromocriptine after 1 week. One month later, the patient reported a normal sexual desire, but his penile erection had deteriorated compared with 1 month ago. We rechecked the sex hormones and

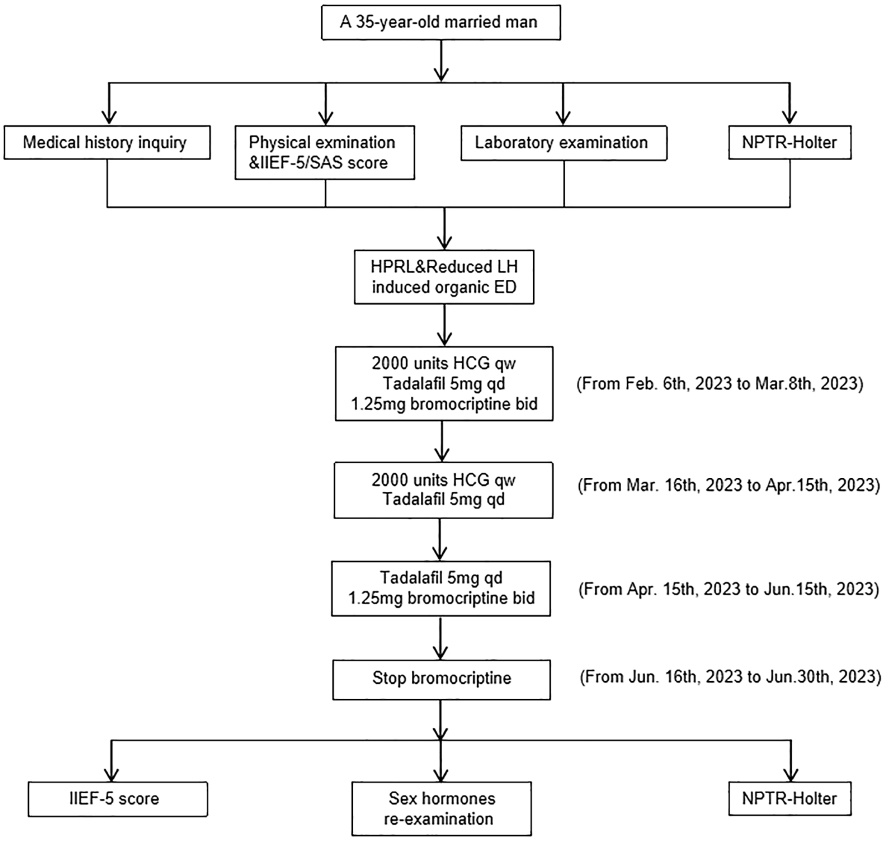

FIGURE 1 Flowchart for the diagnosis and treatment of the patient.

TABLE 1 Blood biochemical profile before treatment in patient.

Variable	Pretreatment	Normal range
CHOL (mmol/L)	4.16	2.30–5.70
TG (mmol/L)	1.06	0.48–2.30
HDL (mmol/L)	1.67	0.90–1.68
LDL (mmol/L)	2.34	1.40–3.10
FBG (mmol/L)	5.28	3.90–6.10

Abbreviations: CHOL, total cholesterol; FBG, fasting blood glucose; HDL, high-density lipoprotein; LDL, low-density lipoprotein; TG, triglycerides; VLDL, very-low-density, lipoprotein.

found that the LH level was 0.68 mIU/mL (a significant decrease compared with the pretreatment level), and the PRL level was 29.14 ng/mL. Therefore, we stopped the HCG intramuscular injection, maintained the use of 5 mg tadalafil daily, and resumed the administration of bromocriptine 1.25 mg twice daily. One month later, the patient reported satisfaction with his current sexual function. The sexual hormone test revealed the following: LH level 1.7 mIU/mL and PRL level 18.22 ng/mL. This protocol was continued for another month. The patient reported his sexual function completely recovered. The result of the sexual hormone test was as follows: LH level 2.21 mIU/mL and PRL level 10.44 ng/mL. Then, we stopped using tadalafil, changed the use of bromocriptine to 1.25 mg once a day, and gradually stopped taking it after 2 weeks. The re-examined PRL and LH levels were normal (Figure 1, Table 2). The patient was satisfied with the therapeutic effect, and the IIEF-5 score was 23 points. The NPTR–Holter test showed effective erection time (3 times, maximum: 32 min), average rigidity in the head (55%), and average rigidity in the base (51%) (Table 3).

3 | DISCUSSION

3.1 | Etiology analysis

ED is common in andrology clinics, with a high incidence in the aged individuals. However, nowadays, an increasing number of youth experience ED, which may be due to overweight, hyperlipidemia, diabetes, sleep deprivation, and medication. Some cases are purely attributed to psychological disorders, which can be identified through NPTR–Holter test.[8,9] In addition, some may be closely related to hormonal dysfunction, of which HPRL is relatively common.[10] The most frequent cause of HPRL was pharmacological, in 39.1% of patients, the second most frequent cause was idiopathic (29%) and tumors (8.5%). Idiopathic HPRL is diagnosed with persistent HPRL and

Erectile function related indicators	Pretreatment	Posttreatment
Maximum effective erection time	8 min	32 min
Average head rigidity	38%	55%
Average base rigidity	36%	51%
IIEF-5 score	14 points	23 points

TABLE 2 Changes in LH and PRL levels during treatment; normal range, PRL: 3.46–19.4 ng/mL; LH: 1.89–12.7 mIU/mL.

Treatment protocol/blood draw date	LH (mIU/mL)	PRL (ng/mL)
Pretreatment/February 6, 2023	1.62	31.27
Bromocriptine (bid) + HCG + Tadalafil/March 8, 2023	1.14	18.62
Bromocriptine (qd,7d) + HCG + Tadalafil/April 15, 2023	0.68	29.14
Bromocriptine (bid) + Tadalafil/May 16, 2023	1.7	18.22
Bromocriptine (bid) + Tadalafil/June 15, 2023	2.21	10.44
Bromocriptine (qd,14d)/June 30, 2023	2.28	11.16

TABLE 3 Changes in erectile function related indicators after treatment.

a negative pituitary magnetic resonance imaging (MRI) in the absence of other causes. Contrary to idiopathic HPRL, some forms of HPRL may be related to psychological disorders.[11–13] In the present case, the PRL level did not significantly increase, the possibility of a pituitary tumor was relatively low, which might be attributed to a psychological disorder. After consulting with the patient, a pituitary MRI was not performed.

HPRL can interfere with the rhythmic release of gonadotropin-releasing hormone (GnRH) from the hypothalamus, thereby inhibiting the release of follicle-stimulating hormone and LH from the pituitary.[14] LH is a glycoprotein type of gonadotropin secreted by pituitary cells, which can promote the conversion of cholesterol into testosterone in the testes, ultimately affecting male sexual desire and erectile function. Besides, reduced LH levels may be caused by hypothalamic–pituitary diseases, such as tumors or inflammation, or may be attributed to unexplained idiopathic hypogonadism.[15] Staying up late or excessive mental stress may lead to hormonal imbalances in the body, resulting in the reduction of LH levels.[16,17]

Data showed that men with low testosterone levels were at a higher risk of developing ED than men with normal testosterone levels.[18] Also, evidence suggests that supplementing testosterone for men with low testosterone levels can improve their erectile function to a certain extent.[19] Animal experiments have shown that testosterone deficiency can cause a decrease in the smooth muscle activity of the corpus cavernosum, leading to venous occlusion disorders. It may also cause damage to the pelvic ganglia, cavernous nerves, and dorsal nerves, as well as dysfunction of the sinus endothelium of the corpus cavernosum, ultimately affecting penile erection.[20–22] A study also indicate that testosterone deficiency can lead to changes in the structure and function of internal penile arteries, thereby affecting penile blood supply.[23] Of course, all significant changes in the structure and function of the penis may only occur due to a significant decrease in testosterone levels after some time. In the present case, we hypothesized that reduced LH levels caused a decrease in testosterone levels, resulting in a lack of sexual desire and potentially leading to ED. Moreover, low libido itself might affect sexual arousal, ultimately influencing penile erection. Also, the patient with ED might lack interest in sexual activity.

3.2 | Medications

As a dopamine agonist, bromocriptine is the most commonly used drug to treat HPRL. Usually, the treatment of mild HPRL starts at low doses (2.5–5 mg daily).[24] Although the incidence is not high, stopping bromocriptine treatment may lead to a rebound after PRL returns to normal. A shorter treatment time may lead to an increase in the incidence rate.[25] In the present case, we also found that the PRL rebounded when the patient stopped taking bromocriptine for 1 month. However, after continuing bromocriptine intake for 2 months before stopping the medication, the patient's PRL fell to normal and did not rebound again. Also, the patient's erectile function indicators and sexual desire improved to some extent. This suggested that the treatment of patients with HPRL and ED required a relatively long medication time when a small dose was administered.

Hence, we concluded that it would be more reasonable to use bromocriptine for treating ED induced by HPRL accompanied by reduced LH levels rather than using of HCG injection so as to increase the LH levels in the serum. HCG

and LH have the same α subunit, while their β subunit has 80% homology, which can bind to the luteinizing hormone/choriogonadotropin receptor (LHCGR). This receptor is expressed in Leydig cells of the testis.[26] Thus, exogenous HCG supplementation can induce a biological effect similar to that of LH, stimulating testosterone production. Meanwhile, this inevitably inhibits the pituitary gland from releasing LH through a negative feedback mechanism. This may be the reason why the level of LH in the present case obviously decreased compared with the pretreatment level after continuous intramuscular injection of HCG for 2 months. This kind of negative feedback has also been observed in other cases, affecting patient's confidence in recovery and inducing anxiety. HCG did not improve the patient's own LH secretion, whereas bromocriptine could improve the LH level by downregulating the PRL expression to restore the libido in the case. However, we were not certain whether the use of bromocriptine alone could help the patient achieve satisfactory erectile function as soon as possible because the impact of improved sex hormones on erectile function might be indirect, as mentioned earlier. Therefore, besides intervening in hormone abnormalities, we used a low dose of tadalafil as a basic treatment. At the same time, we also encouraged the patient to maintain a positive mindset and improve sleep quality to facilitate better maintenance of endocrine status.

4 | CONCLUSION

For sexual dysfunction accompanied by HPRL and reduced LH level, a low dose of bromocriptine (maybe for at least 3 months) may be helpful.

AUTHOR CONTRIBUTIONS

Tao Liu: Conceptualization; writing – original draft; writing – review and editing. **Chao Jia:** Data curation; investigation; project administration; resources. **Yan Li:** Data curation; project administration.

FUNDING INFORMATION

This research did not receive any specific funding.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The corresponding author's data supporting this study's findings are available upon reasonable request.

ETHICS STATEMENT

This case report does not involve ethical issues. Informed consent was submitted by the subject.

CONSENT

Written informed consent was obtained from the patient to publish the current case report.

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How to cite this article: Liu T, Jia C, Li Y. Treatment of sexual dysfunction induced by hyperprolactinemia accompanied by reduced luteinizing hormone levels: A case report. *Clin Case Rep*. 2024;12:e8432. doi:10.1002/ccr3.8432