

# MANIFESTATIONS ASSOCIATED WITH SEXUAL DYSFUNCTIONS CAUSED BY RECTO-SIGMOIDECTOMY

## -Points of view-

<sup>1</sup>Valentin NIȚESCU MD, <sup>2</sup>Andy PETROIANU MD, PhD. , <sup>3</sup>Alexandru RUNCANU MD, PhD.

1.\* Surgery Clinic - “ Louis Pasteur ” Hospital, Colmar, France

2.Department of Surgery, Faculty of Medicine, Federal University of Minas Gerais, Brazil

3. Surgery Clinic-Emergency Clinical Hospital Bucharest “Floreasca”, Romania

### Abstract

*The clinical evaluation of patients with sexual dysfunctions caused by radical recto-sigmoid surgery, including due to oncological pathology, highlighted the existence of associated manifestations, postoperatively evident, in 70-80% of operated patients.*

*In addition to the injuries directly caused by the surgery, the operated patients also complained of manifestations associated with sexual dysfunctions such as a decrease in the quantity and the quality of spermatic fluid, as well as male sterility.*

### Keywords:

*sexual dysfunctions, recto-sigmoid pathology, associated manifestations.*

Manifestations associated with sexual dysfunction secondary to recto-sigmoidectomy more frequently reported by patients (because the dysfunctions negatively affected the resumption of sexual intercourse and required neuro-mental recovery between 6 months and 2 years as a period of "healing" or amelioration) are: bladder located, which may be accompanied by the sensation of defecation or removal of gas bubbles from the remaining rectum (that is 2-6 cm in length), hiccups and pathology of the anorectal resistant segment in patients with colostomy.

These special sensations accentuated the sexual dysfunctions, constituting a reason these patients referred to the sexologist.

I mention that some of those manifestations persisted even after the recovery period.

### **1) Urinary disorders secondary to bladder dysfunction after recto-sigmoid resection:**

- involuntary loss of urine;

- dysuria, initially these two symptoms were explained by maintaining the bladder catheter postoperatively for a longer period (2-3 weeks), implicating the two urethral sphincters;

- nocturia (2-5 urination per night) in patients with normal volume prostate, associated with dysuria;

- the patient cannot retain urine for longer time (the sphincters are no longer continent due to bladder nerve fiber injuries);

- bladder disorders caused by the sectioning of the nerve branches that innervate the detrusor and the urethro-bladder sphincter, produced during the surgical dissection

for excision of the rectum, lymph nodes and adjacent tissue.

- section of the micturition-related nervous motor branches, that alters the detrusor-sphincter functional synergy.

- lesions of the spinal cord nerve branches S2-S4, that determine urinary incontinence by paralysis of the striated urethral sphincter;

- sections of the bladder nerve branches (Fig.1), which generate a difficult micturition, with the abdominal muscles effort, with reduced bladder residue at the beginning of the ailment, without distension, then with bladder distension and unconscious overflow micturition. The patient involuntarily loses a few drops of urine before voluntarily postponing the act of urination, caused by bladder hyperexcitability.

- bladder atony, if it does not have a mechanical cause such as prostate hypertrophy (which decreases the urethral lumen, decreases the contractility and sensitivity of the bladder); if the patient does not immediately evacuate the urine, he involuntarily loses some of the bladder contents (overflow incontinence);

- complete voiding of the bladder (the detrusor no longer contracts), respectively the bladder retention of urine, in time leads to infections.

Urinary retention in the bladder may also be caused by the drug ingestion such as antidepressants or anticholinergics, or by reducing the contractility of the smooth muscle sphincter, which can no longer open completely, even if, initially, there are no obvious symptoms that require the urinary sediment examination and urine culture, respectively the urine antibiogram.

Tests performed in this situation may reveal positive urine cultures caused by urinary tract infections with Gram-negative bacilli (*Escherichia coli*, *Enterobacter*, *Klebsiella*, *Proteus* and *Piocianic*) manifested by dysuria, pollakiuria and cloudy, foul-smelling urine.

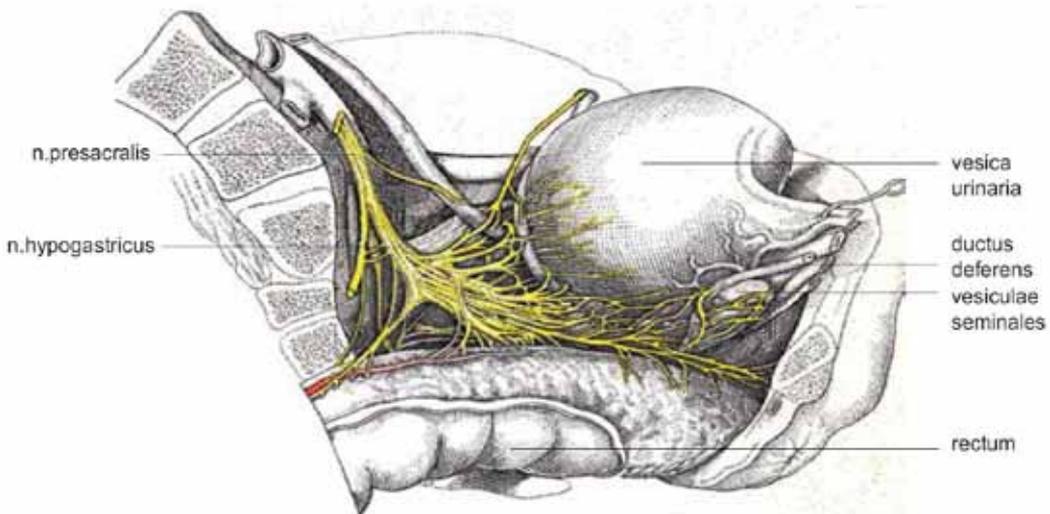
Urinary infections are much more common in women, the urethral orifice being located in the vaginal vestibule, near the upper edge of the entrance to the vagina, the urethral meatus making direct contact with normal genital secretions and, respectively, with those caused by vulvo-vaginal pathology, unlike men, in which the length of the urethra is much longer than women's, being an obstacle to the infection spread.

Regardless of patient's gender, uroculture is mandatory in the lab tests, because the symptoms may be rough or absent, respectively on asymptomatic germs carriers patients, which can not be labeled as "infected patients".

In this context, sexual intercourse is directly influenced by inoculation, through sexual transmission, as well as by the unpleasant smell of the glans, perceived by the sex partner, during fellatio. Fetid odors noticed after sexual intercourse may be associated with subsequent possible infections.

The distension of the bladder wall by the accumulated urine determines nervous impulses to the spinal cord S2-S4, and, reflexively, the contraction of the bladder relaxes the urinary sphincters, triggering micturition.

As similar parasympathetic functions are often associated with the bladder emptying reflex (Guyton), the "gas bubble" discharge reflex may also be initiated from the remaining rectal abutment, usually 2-6 cm long, or from the rectum, when it is still present. The existence of gas bubbles is conditioned by the secretion of the anorectal glands, but also by the vegetative innervation.



**Fig. 1** Hypogastric plexus and innervation of the rectum, bladder and seminal vesicles

(Adapted from Latarjet and Bonnet 1931)

Urine evacuation produces at the moment of distended bladder, which transmits impulses to the sacral spinal cord, and reflexively induces the contraction of the detrusor and the relaxation of the urinary sphincters.

All these may be inhibited by the central nervous system, which controls the act of urination.

The sexual reflex is also an autonomous one, determined, at the central nervous level, by the brain and by the stimuli of the external genitalia receptor cells, that reach the sacral spinal cord and which, reflexively, give the genital erection (predominantly parasympathetic mediated), respectively after copulation producing ejaculation, which is partially achieved by sympathetic function.

**2) Hiccup** is the sound of sudden vocal cords closing for about 35 milliseconds as a result of violent contraction of the respiratory muscles.

When hiccups last more than 48 hours or occur frequently, a tumor or lesion of the central nervous system, namely esophagitis, gastric distension, ileus, infections and stimuli of the peripheral nervous system of the head, neck, thorax or abdomen may be suspected; hiccups may also appear due to surgery such as Miles-type rectum amputation or Hartmann-type rectum or sigmoid resections, or may be caused by the distension of the colon's splenic angle due to an inefficient colostoma, with difficult evacuation of the intestinal contents through the abdominal musculo-aponeurotic tunnel. In other words, all the events that lead to vagus nerve stimulation may produce hiccups.

The reflex arc of the hiccup is composed of the afferent pathway, the efferent one

and the nerve center. The afferent (sensitive) pathway includes the vagus nerve, the phrenic nerve, and the sympathetic chain at the spinal cord T6-T12 level. The nerve center of the reflex arch is surrounded by the brainstem, mesencephalon, reticular substance and hypothalamus, which connects the afferent and efferent (motor) pathway. The efferent pathway is formed by the phrenic nerve (C3-C5), the branch innervating the anterior scalene muscle (C5-C7), the recurrent laryngeal nerve and accessory branches innervating the intercostal muscles (T1-T11).

Under the influence of stimuli that act on the reflex arch, the patient may have persistent hiccups. In these cases, treatment is nonspecific, starting with non-pharmacological remedies, which include stimulation and suppression of vagus nerve stimuli such as ingestion of sweet fluids, pharyngeal stimulation, compression of the eyeballs, compression of the carotid artery, Valsalva maneuver.

Pharmacological treatment of hiccups involves the administration of anticonvulsant drugs, or of gamma-aminobutyric acid analogues or of dopaminergic receptor agonists.

If these treatments prove to be ineffective, nerve "blocks" are practiced (block at the level of the stellate ganglion).

The mechanism by which the stellate ganglion block works is still unclear; it is assumed that the sympathetic pathway of the reflex arch is interrupted, with the immediate improvement of the symptomatology. This block is achieved by perineural injection of local anesthetic.

Treatment of persistent hiccups is important for improving the patient's quality of life as it can lead to insomnia, depression, con-

traction of the abdominal wall, affecting its integrity in the immediate postoperative period.

The smell or taste of a food causes a nerve impulse to the nuclei of the vagus cranial portion, the glossopharyngeal and the salivary nerves in the brainstem, which transmit impulses through the parasympathetic nerves to the exocrine glands of the oral cavity and stomach, stimulating digestive secretion.

### **3) The defecation perception**

The activity of the gastrointestinal system is coordinated by the intramural nervous plexus, located in the walls of the digestive tract. Vegetative nerve stimuli (sympathetic and parasympathetic) acting on the brain influence gastrointestinal physiological activity. The nervous system stimulates peristalsis and relaxes the sphincters, propelling the intestinal contents, and the sympathetic nervous system increases the sphincters' tone, thus inhibiting intestinal peristalsis and reducing secretory activity (resulting in constipation).

The rectum is controlled by autonomous reflexes. The accumulation of feces in the rectum produces its distension, and the sacral spinal cord determines, by spinal reflex, through the sacral parasympathetic nerves, the act of defecation, due to strong peristaltic contractions. In the presence of colostomy, peristaltic contraction eliminates intestinal contents.

When the rectum is loaded, the rectal wall distension causes impulses that reach the sacral spinal cord S2-S4, which sends a nervous impulse through the sacral parasympathetic nerves to the distal portion of the colon, triggering peristaltic contractions that determine the defecation.

One of the essential functions of the colon is the water and electrolytes absorption from its contents, thus giving consistency to the feces, the distal half of the colon having a storage role.

In the case of rectal, or sigmoid or recto-sigmoid resection, the contents of the colon are removed through the colostomy. The existence of a stoma and a restant rectal portion of 2-5 cm may reflexively cause the sensation of defecation, respectively the elimination of gas bubbles, secreted by the glands of the anorectal segment, which is eliminated simultaneously with urination, especially at night.

Also, the operated patient easily perceives the accelerated intestinal peristalsis or the colonic content voiding, visible at the level of the colostomy.

If the evacuation of the colonic contents is affected at the level of the abdominal wall, the parietal projection of the colon may be seen, that indicates a deficient intestinal evacuation.

The colonic distension secondary to the difficult evacuation of the colonic content at the level of the colostomy is determined by the stenosis of the colonic segment, the patient perceiving the enlargement of the abdomen, swollen by meteorism.

The defecation reflex is normally intrinsic (enteric nervous system of the rectal wall) in which the feces in the rectum relax its wall, causing impulses that stimulate peristalsis of the descending colon, propelling the fecal mass to the anus, where the internal anal sphincter relaxes from the inhibitory effect of myenteric plexus. If the external sphincter also relaxes voluntarily, defecation occurs,

the parasympathetic fibers of the pelvic nerves increasing the efficiency of the act of defecation.

Secondary to the sectioning of the nerve fibres, which reach the perineal muscles, especially those of the anal orifice, the tone of these muscles decreases and, by relaxing the perineal muscles, the anal orifice becomes permeable to the index insertion maneuver, easily allowing the contents of the rectal abutment to drain.

All the mentioned morpho-physiological aspects have representation at the cerebral level, with secondary neuro-psychic manifestations, accentuating the sexual dysfunctions and thus the normal functions become "dysfunctions".

#### **4) Pathology of the restant anorectal segment**

**Proctalgia** is the anal pain, sometimes violent, transient, localized; it is determined by the local venous stasis and also by the secretion of the glands of the rectal rest.

**Anal itch** is the sensation of local itching, with variable duration and intensity; in addition to local causes, the etiology included diabetes, liver failure, endocrine or allergic causes.

**Rectitis (or anorectitis)** is a a local microbial condition (viral, bacterial, parasitic, fungal) or is due to inflammatory causes or as a consequence of local irradiation; sometimes may be only the effect of a trivial rectal ulceration.

**Inflammation of the perineal glands** is revealed by the presence of small painful swellings at the edge of the anal orifice.

All these manifestations associated with

the pathology of the anorectal restant segment obviously accentuate absolutely all types of sexual dysfunctions.

The secretion of the mucous glands of the remaining anal canal, from the rectal ampulla (Fig.2), in 78% of cases showed colonization with *Proteus mirabilis*, which, at the level of the anal orifice, generated a secretion with a peculiar odor, sometimes itching and local pain of increased intensity for 2-3 days, requiring the administration of local treatment with antibiotics.

In the first postoperative year, both those listed and the presence of colostomy, which generally, after 1-2 days, emits an unpleasant odor and appearance, which is noticed by the operated man and his sex partner; sexual inhibition and accentuate libido and erectile dysfunctions produce.

Inside the mesorectum, at the operative moment of rectal dissection, rectal vascular branches and nerve threads of the posterior scrotal nerves, dorsal nerve of the penis, inferior perineal nerve and pudendus nerve are sectioned (Fig.3), causing local ischemia, including the perineal muscular planes with interest in both the anal orifice and the base of the penis, accentuating erectile dysfunction (which practically becomes semi-erection, with specific morphophysiology).

Also, the decrease of the perineum-penis zonal muscle tone obviously determines the difficult elimination of the sperm fluid, aggravating the ejaculation and orgasm dysfunctions.

The surgical sectioning of the nervous vegetative and somatic and vascular branches modifies the morphophysiology of the pelvic organs, including that of the bladder (Fig.4).

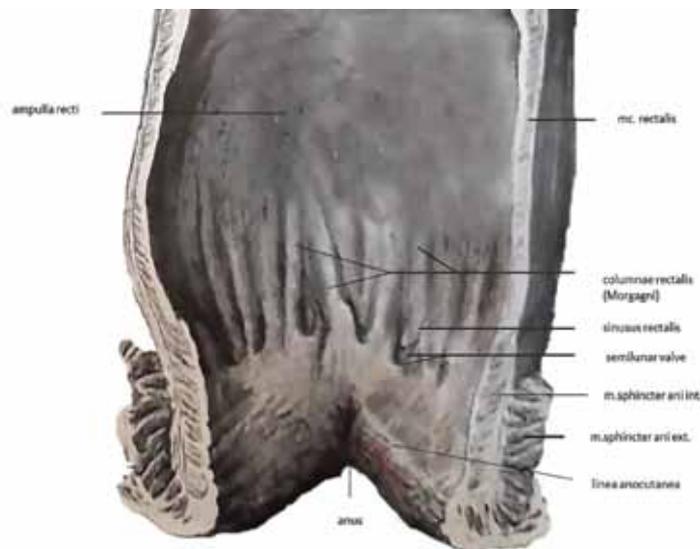
So, theoretically, the local neuro-vascular system is connected by the spinal cord pathways to the brain, but, practically, the sectioning of the receptor neurovascular threads of these organs makes them no longer be subject to brain control or administered treatment, in terms of functionality, explaining the occurrence of sexual dysfunctions accrued by operated patients.

A conclusive example is the phosphodiesterase 5 (PDE5) inhibitors treatment recommendation, which not only does not provide the desired erection but may cause cardiovascular or ischemic stroke, either by simple administration or by gradually supplementing the doses in the desire to achieve an erection.

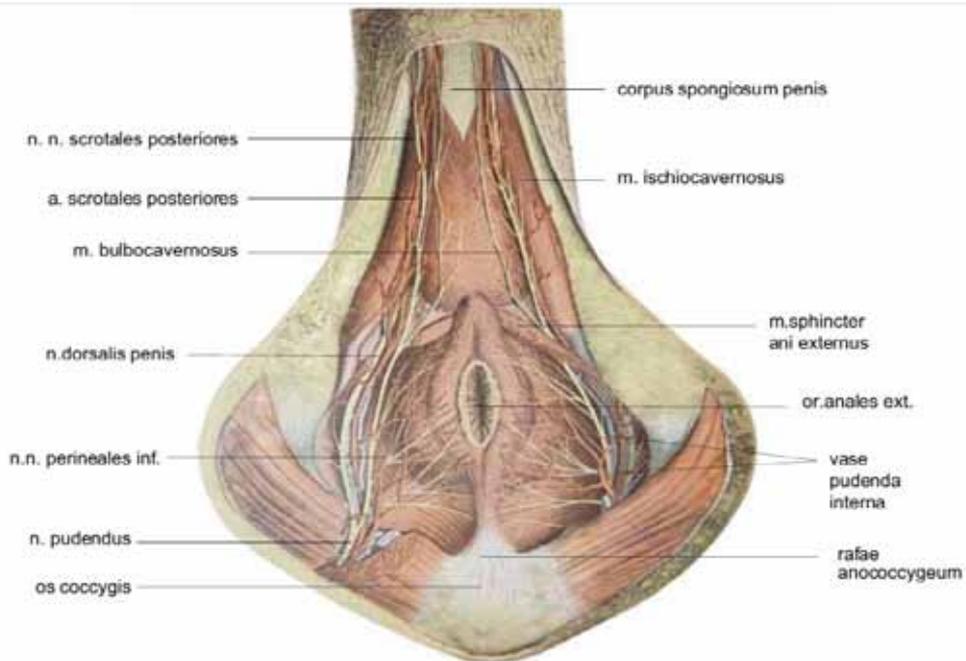
Sectioning of vegetative nerve threads innervating the bladder in men (Fig.4) and

women (Fig.5) especially in the elderly between 70 and 82 years, in 72% of cases in our statistics determined the increase of the frequency of nocturnal micturition, with weak flow and several interruptions, increasing the time of partial bladder voiding, with all the additional effort of the abdominal muscles.

This situation increases the patient's general discomfort, by fragmenting night sleep and inherent daytime fatigue, that negatively influences sexuality and thus compromised by damage to the parasympathetic nerve fibers, which normally play a role in the erection of the penis, increasing blood flow in the corpora cavernosa, sympathetic nerve fibers having a role in the emission and ejaculation of sperm.



**Fig. 2** Remaining anal canal; Anorectal pathology: 1. anal fissures, decreased sphincter tonicity, inflammatory processes, perineal abscesses with starting point infection of a glandular crypt in the Morgagni sinuses, ulcerations; 2. the sensitivity of the cellular receptors of the anal epithelium, perineum, scrotum and vulva is markedly reduced, a context in which sexual „information” can no longer be provided to the spinal cord, which thus can no longer determine the erection necessary for sexual intercourse. It has to be mentioned that the erection degree is proportional to the intensity of the above stimulation, regardless of whether it is physical (S2 S4) or mental (V.Nițescu)



**Fig. 3** Anal region: nerve threads and vascular branches, which by sectioning changes local physiology causing sexual dysfunction and contractile dysfunction of anal orifice, with continuous discharge of the anal glands. (Adapted from Sobotta – Figge 1963)

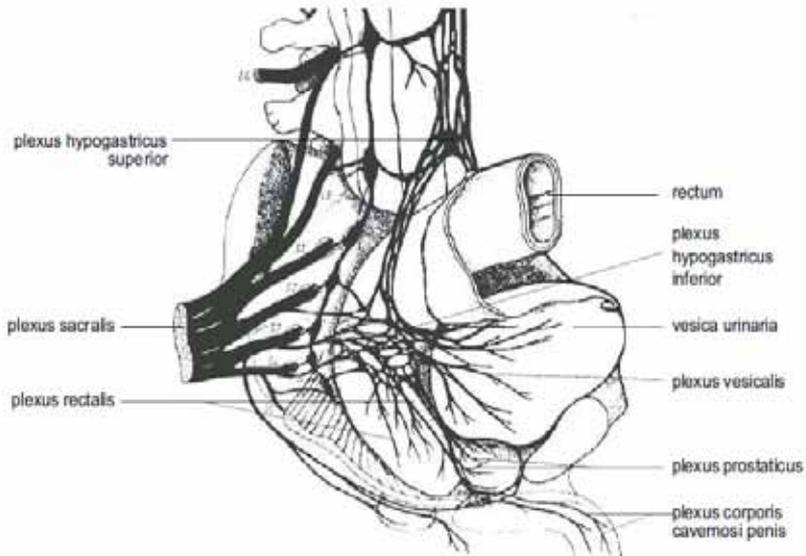
Vasoconstriction of the penile veins negatively influences the erection. Also, the sectioning of the vascular-nervous elements no longer stimulates the elimination of sperm from the vas deferens, which continues the epididymal duct, reaches the pelvic cavity and goes to the bladder's fundic portion. Here, the vas deferens presents an ampulla, which continues with a thin duct that joins the neck of the seminal vesicles, muscular-membranous reservoirs that store about 55% of the secretion.

The seminal secretion contains, among others, fructose, which has nutritional value for sperms, prostaglandins, which intervene

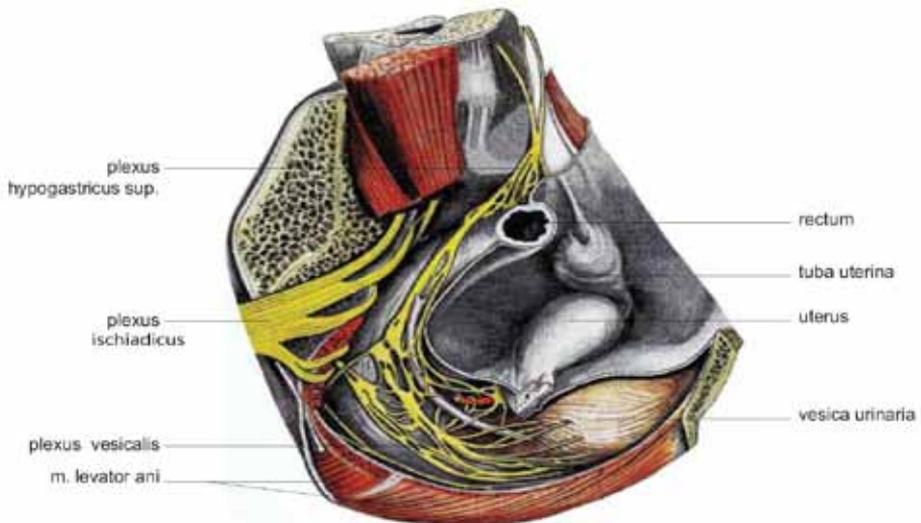
in uterine contractions and in tubal peristalsis, respectively mucus, which helps the mobility of sperm. The seminal vesicles accumulate sperm in the interval between ejaculations.

Surgical damage to the neuro-vascular structures, especially the bladder and perineal ones, is responsible for the mentioned ejaculation and orgasm sexual dysfunctions, even if, in the elderly, the amount of sperm fluid is 2-2.5 ml per ejaculation, situation present in over 86% of patients aged 70-82 years. It should be mentioned that, in Romania,

this preventive approach failed, the vaccination



**Fig. 4** The vegetative/autonomous pelvic innervation in male- schematic drawing  
(Adapted from Benninghoff-Goertler 1979)



**Fig. 5** Pelvic innervation in female (Adapted after Hofferl 1957)

### **5) Reducing the quality and quantity of sperm fluid**

This ejaculatory dysfunction is a manifestation associated with sexual dysfunction caused by accidental lesions, produced during rectal tumor operations, in addition to the implication of the pelvic vascular-nervous elements, such as the pelvic ureter, prostate, seminal vesicles, vas deferens and ejaculatory ducts lesions.

The damage of these structures is followed by the modification of the quality and quantity of the spermatic fluid (Vasile Nitescu) as follows:

- by sectioning the seminal vesicles, the sperm is no longer stored in the interval between ejaculations, fructose (essential in sperm nutrition) is no longer secreted and there are no more citric acid, fibrinogen and mucus, that sustain the sperms mobility.

- by affecting the prostate, the prostate fluid (rich in lecithin, zinc, calcium, citrates, phosphates and profibrinolysin) which enters the composition of semen, no longer exists.

Its absence from the semen content, which is rich in vesiculose, no longer causes a coagulating effect on the ejaculated sperm fluid and, due to the lack of fructose and citric acid, decreases the mobility of sperm, leading to sterility.

In the normal male, that is not operated in the recto-sigmoid region, the prostate secretion is alkaline, buffering the citric acid in the vas deferens, thus not allowing the destruction of sperm.

In this context, the quantity and quality of the sperm fluid decrease, a fact noticed by the sex partner during fellatio, according to the

reports of 5-7% of the operated patients.

So, the surgical lesions of the male pelvic genital structures also determine his sterility.

## **Conclusions**

Due to the lesions produced intraoperatively, the surgery of the rectosigmoid pathology may determine the occurrence of sexual dysfunctions, which are accentuated by the manifestations associated with them.

The complex manifestations of sexual dysfunctions are interrelated with the severity of the recto-sigmoid pathology, with the duration of the septic time, with the degree of urgency of the intervention as well as with the professionalism of the operator.

Of course, sexual dysfunctions are more severe in men, who can not achieve intercourse in the absence of an erection.

In addition to the lesional changes that occur in the pelvic anatomical structures, the brain can no longer perceive the sensations of local sensory receptors alpha-1 type, located mostly in the glans and vulva and which are under strict vegetative nerve control, all these accentuating libido and erectile dysfunction.

The hiccups that occur in patients with recto-sigmoid excision were considered either psychogenic or due to gastroesophageal reflux that preceded the operation, but was aggravated by it.

## **Conflict of interest**

The authors do not report any conflict of interest.

## References

1. Coculescu M., Neuroendocrinologie Clinică, 293, Ed. Științifică și Enciclopedică, 1986.
2. Errante D, Bernardi D, Bianco A, et al Recurrence of exhausting hiccup in a patient treated with chemotherapy for metastatic colon cancer Gut 2005;54:1503-1504.
3. Guyton A. & Hall J.,Tratat de Fiziologie a omului, Ediția a11-a, Ed.Medicală Callisto, 1023, ISBN(13) 978-973-87261-4-7, 757,758, 789,790,822,2007.
4. Grigorescu M., Irimie A., Beuran M., Tratat de Oncologie Digestivă, Vol.III, Ed. Academiei Române, 157-181, 198-207, 395-406, 408-413, 2013.
5. Hortolomei N.,Țurai I.Chitutgie Vol.5, Ed.Medicală 1959.
6. Hosoya R, Uesawa Y, Ishii-Nozawa R, Kagaya H. Analysis of factors associated with hiccups based on the Japanese Adverse Drug Event Report database. PLoS One 2017; 12:e0172057.
7. Hafferl Anton, Lehrbuch der Topographischen Anatomia, 622, 1957.
8. <https://www.esmo.org/content/download/67384/1215683/1/ESMO-ACF- CANCERUL- COLORECTAL-GHID-PENTRU-PACIENTI.PDF>
9. Juan Rey R, Solari LA. El paciente con hipo. [The patient with hiccups] Lo cotidiano, lo agudo, lo complejo. 2010;1(7):18–19.
10. Latarjet A., et Bonnet P: Lyon Chir.9, 613-644, 1931.
11. Lee AR, Cho YW, Lee JM, Shin YJ, Han S, Lee HK. Treatment of persistent postoperative hiccups with stellate ganglion block Three case reports. 2018 [cited 2021 Feb 16]; Available from: <http://dx.doi.org/10.1097/MD.0000000000013370>.
12. Lupu G., Anatomia Aparatului Digestiv, Ed. Universitară Carol Davila, 123-157, 2010.
13. Newsholme Davis J. An experimental study of hiccup. Brain. 1970;93(4):851–872.
14. Nițescu V., Treaty of Clinical Sexology, The Publishing House of the Romanian Academy, 32-38, 2018.
15. Nițescu V., Totul despre sexualitatea normală și patologică, 80- 81,86- 88, ISBN 973-692-055-0, Ed.Muntenia, 2004.
16. Nițescu Vasile: Decline of Sexual Function in Men Between Physiological Senescence and Plurietiological Hyposexuality - Part II-, Journal of Clinical Sexology, Vol.3, No.3 89-103, DOI:10.37072/JCS.2020.03.01, 2020.
17. Nițescu V., Nițescu Valentin, Types of rectal surgery and related sexual dysfunctions, Journal of Clinical Sexology, Vol.2, No.2, 58-71, DOI:10.37072/JCS.2019.02.01, 2019.
18. Nițescu V., Nițescu Valentin, Types of sexual dysfunctions following rectal pathology surgery- Part I,II, Vol.2, No.3-4, 105-118, 128-139, DOI:10.37072/JCS.2019.04.01, DOI:10.37072/JCS.2019.04.03 2019.
19. Pan J. X., Lechan R. M., Lin H. D.: Endocrinology, 116, 4, 1663, 1985.
20. Petre G, Fabian O., Anatomia Mezorectului, Momente Cheie ale Exciziei Totale de Mezorect în Prevenirea Complicațiilor Genito- Urinare în Chirurgia Cancerului de Rect, Jurnal de Chirurgie (Iași), Vol.8, Nr.2, Pag. 192-203, 2012.
21. Runcanu A., Nițescu Valentin: Recto- sigmoid tumor pathology and disorders of normal sexual intercourse, Journal of Clinical Sexology, Vol.3, No.3, 113-120, DOI:10.37072/JCS.2020.03.02, 2020.
22. Sobotta- Figge, Atlas of Human Anatomy, vol III, Part I, 8Th English Edition, 133, 1963.
23. Steger M., Schneemann M. , Fox M., Systemic review: the pathogenesis and pharmacological treatment of hiccups, Aliment Pharmacol Ther 2015; 42: 1037–1050.
24. Souadjian JV, Cain JC. Intractable hiccup. Etiologic factors in 220 cases. Postgrad Med 1968; 43:72.