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NON INVASIVE TREATMENT OF THE VULVOVAGINAL ATROPHY

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KEYWORD

Vulvovaginal atrophy (VVA), dyspareunia, Foemina, Biodermogenesi®, vaginal aesthetics, menopause.

ABSTRACT

Vulvovaginal atrophy (VVA) is an increasing widespread pathology, regarding some women, due to the extension of the average of the life. VVA determines the atrophy of the small and the large lips, dyspareunia, inflammation, urinary and blood loss. We have examined ten menopausal patients for four years. All the patients observed were affected by alterations described above and we have subjected them to a cycle of 8 sessions of Biodermogenesi® FOEMINA therapy, a treatment based on electroporation and electromagnetic fields. We have observed then the benefits obtained after the first, the fourth, the eighth sessions and three months after the end of the cycle.

The results are definitely encouraging, in fact, significant improvements were evident since the first session of the treatment arriving to the total loss of urinary and blood loss, increasing 240% the vaginal lubrication the substantial regression of the vaginal atrophy and significant attenuation of dyspareunia (-97.62%) and irritation (-92.50%). We strongly believe that Biodermogenesi® FOEMINA treatments can offer and open new therapeutic horizons in the treatment of the VVA, thanks to the absolute lack of side effects and downtime.

INTRODUCTION

The loss of estrogens, produced by the ovaries, is common during peri-menopause.

This low level can cause significant changes in body and woman's organs. The estrogen deficiency is also responsible formetabolic disorders, involving sleep cycle and mood, vascular disease, problems with skin elasticity and in bone mineral density.

One of the most common symptoms of low levels of estrogens is the Vulvovaginal atrophy (VVA).

This loss of estrogens can reduce the natural elasticity and lubrication of the vaginal tissue. The walls of the vagina can become thin and fragile, with the thinning of the epithelial lining and a lower genitourinary tract.

Symptoms belonging to this VVA are also vaginal dryness, introital dyspareunia, urinary and sometimes even blood loss and increase of the pH value.

This condition can be extremely uncomfortable and more importantly can interfere with maintaining intimacy with their partners.

The increasing life expectancy for women leads to a longer menopause.

The more interest in VVA brought two consequences:

On one hand the demand for therapies designed to mitigate the typical alterations of the VVA with a particular interest in aesthetics and vaginal rejuvenation, on the other hand different studies related to both VVA alterations[3,25,26,35,36] and results connected to aesthetics and rejuvenation of the vagina[40].

Despite the greater demand for specific therapies, the VVA is, unfortunately, still a pathology heavily underestimated.

63% of women ignore that VVA is a chronic condition destined to get worse over the time[4]. About the 70% of women with these symptoms don't ask for some help to their doctors, considering them a natural condition of menopause. Moreover, the reluctance and embarrassment of women dealing with this pathology contributes to a late correct diagnosis of VVA[5]. From one research, it emerges that 75% of patients with clinical manifestations of VVA don't rely their doctor have adequate information regarding therapies concerning how to heal these problems[6].

The most common causes for VVA are, as we discussed earlier, of course menopause, but also surgical interventions and chemotherapy.

Only 4% of women experience VVA symptoms in the first year after the last menstruation, after seven years at least 50% of women are affected by this pathology[28]. According to a recent European epidemiological survey, in which more than 2000 women in post menopausewere examined, VVA symptoms were observed in 90% of the patients. The results also showed a significant lower quality of life compared to postmenopausal women without alterations[7].

The VVA can heavily change the life quality of a woman, compromising the normal daily activities, intercourse[33] and interpersonal relationships[28]. From a physiological point of view, patients affected by VVA develop a thin, dehydrated and fragile vulvar epithelium; the vagina is also retracted with a reduced depth of its opening, the labia, the clitoris, the urethra and the urinary bladder appear altered[2].

From a clinical point of view these changes affect the natural elasticity and lubrication of the vaginal tissue causing dryness, itching, overactive bladder with a sudden urge to urinate, incontinence, dyspareunia, irritation and inflammation. Gradually the vaginal tissue become less elastic, lose the difference between small and outer lips and reduce both vascularization and glandular secretions, causing a less lubrication during sexual activity, making the walls of the vagina less resistant to injury and "trauma", thus raising the possibility of blood loss.

Nowadays researchers are more aware of VVA and, to avoid heavy consequences, are proposing different therapies and approaches to this pathology; topical medicines, hormonal therapies, invasive laser therapies, and other medical devices (e.g. electroporation and capacitive radiofrequency) are the main remedies.

Lubricants

According to international standards, the first-line recommendations to treat moderate VVA manifestations are non-hormonal vaginal lubricants[38]. Two main categories can be distinguished: short-term lubricants, which are used before sexual intercourse, and long-term lubricants that must be used daily.

These therapy options are also recommended for women who are forbidden to use vaginal estrogen preparations[8]. Lubricants provide only a short relief from vaginal dryness and discomfort.They are mainly water, silicon or oil-based products, that need to be applied on the vulva, vagina and possibly on the penis before sexual activity[8]. Although they are safe, there's in literature evidence of risk of developing bacterial vaginosis andvaginal candidiasis infections[9, 10, 30] with a prolongeduse of these lubricants.

Local and systemic hormonal therapies

Considering the pathogenesis of the development of VVA and the main cause (hypoestrogenism) the most simple and logical choice to treat this condition is the "hormone therapy" based on estrogens[32, 34, 39].

There are two different methods of administration of these drugs:

The replacement of vaginal estrogens can be carried out with hormonal preparations with systemic or local action, containing estradiol, estradiol valerate or conjugated estrogens.

The most common local therapy is vaginal creams based on conjugated equine estrogens and estradiol[5] to be applied locally. This way the quantity of product applied can vary; by exceeding with the recommended daily dosage patient could be exposed to potential side effects. According to Kingsberg et al., many women experience discomfort using vaginal cream, considering it "messy".

A different way to administrate a more controlled dosage of estrogens may consist in vaginal tablets containing 10 mg of estradiol[12] to be taken daily.

However, these tablets are often considered annoying and difficult to handle during the day. An alternative could be the vaginal ring with an extended release of estradiol[13].

Unfortunately, even this solution is not free from side effects. The use of vaginal rings is not recommended in women with vaginal prolapse and in women having experienced a previous expulsion of the vaginal ring.

According to the 2006 Cochrane review, the three forms of drug administration mentioned above are equally effective and there are no significant differences between benefits and side effects[14,15].

In all the three forms of topical estrogen treatment the risk of vaginal bleeding was found and there were no benefits with regards to vasomotor symptoms[12]. Whatever is the methodology applied, patients should always be aware of

the fact that benefits will be achieved only after 1-3 months of estrogen therapy[16,17].

A clinical examination has to be performed to identify all the possible risks of complications due to the estrogen therapy. The use of high doses of estrogen, especially in menopause, is associated to a high risk of endometrial cancer, hyperproliferating adenocarcinoma[12], heart disease, breast cancer, thromboembolic complications and cerebrovascular diseases[18].
Recently Mitchell et al. had led to a great deal of controversy with the use of these drugs comparing patients treated with estrogen and those treated with placebo, where no advantage was shown between the two groups[19].

Selective estrogen receptor modulators

Oral Estrogen Receptor Modulators SERMs are a different therapy against VVA particularly recommended for women who estrogen preparations are contraindicated. SERMs are structurally different and able to interact with intracellular estrogen receptors as allies or antagonists of estrogens. Literature has already accumulated sufficient reports about the use of oral ospemifene[1]. In Constantine et al.'s[20] double-blind and placebo-controlled study no cases of endometrial cancer were reported and less than 1% of the patients has shown endometrial hyperplasia. However, this drug leads an increase in the risk of venous thrombosis, therefore it should be avoided in patients with a genetic predisposition or in patients with vascular problems. The Lasofoxifene, new third generation SERMs, seems to be extremely promising[21]. Although it hasn't been already approved by FDA, it seems to bind to both types of estrogenic receptors.

Vaginal dehydroepiandrosterone

Dehydroepiandrosterone (DHEA) is a steroid prohormone in the biosynthetic pathway of testosterone and estradiol. Labrie et al.[22]in a new prospective, randomized, double-blinded study have confirmed the local beneficial effect of intravaginal DHEA (prasterone) to treat mild and severe symptoms of dyspareunia, which is the most common manifestation of genitourinary syndrome of menopause. A daily vaginal use of DHEA [Intrarosa® (prasterone) (6.5 mg)] has recently been approved by the FDA for the treatment of dyspareunia.

Hyaluronic acid

Although there is no significant scientific literature, this treatment has found a good success in the vaginal aesthetics. However, the treatment has some typical side effects from hyaluronic acid administration, such as injection pain, long term edema and granulomas.
This therapy aims to improve the consistency and the hydration of the labia minora only, since the hyaluronic acid will be physiologically absorbed by the human body.

Laser therapies

Laser therapies can also be used in the treatment of VVA.
At first a great enthusiasm for this solution spread and comparative studies[27] with estradiol revealed the ability of Erbium:YAG laser to stabilize longer the results achieved. Tadiret al.[31] then started to study its advantages, disadvantages and limits.
Although lasers are recently introduced in VVA therapy, they have initially provided an apparent efficacy and a high level of satisfaction among patients and healthcare professionals.
In a recent article, FDA raised some doubts and warned about the use of these devices, reporting unpleasant vaginal burns, scars and chronic pain[23, 24] as possible consequences of vaginal laser therapy.
FDA also noticed an inappropriate marketing about "vaginal rejuvenation" questioning about the effective results of the laser therapy and clarifying all possible side effects. They also made clear that side effects seem to be so extreme that complications do not justify a nice aesthetic result.
FDA explicitly admonished many device manufacturers that play a very important role around the world.
FDA also states that selling products not adequately tested and therapies not documented can cause unnecessary injuries and can also prevent patients to cure themselves in time with adequate medical therapies[23]. FDA has reported that these treatments could lead to vaginal burns, scars and chronic pain[24].

Electroporation

As reported by Kutzler et al.[43], electroporation, generally used for treating VVA, had positive results delivering drugs through the vaginal mucosa.
Kichaev et al.[44]observed the therapeutic efficacy of this treatment by experimenting needle handpieces on rabbits' mouth mucosae; this seems it can facilitate the absorption of medicines through the mucous membranes in absence of side effects.

Capacitive radiofrequency

This therapy has recently been used in gynaecology with positive results in the reduction of vaginal laxity.

Millheiser et al.[41]observed immediate improvements in 67% of patients treated, and consolidated improvements in 87% of the patients in the following six months after the end of the therapy. Among other things, no side effects were reported.
Alinsod et al.[37]used technology on a group of 25 women, aged between 21 and 65, with difficulty in reaching orgasm with their partners. Only two patients registered minimal improvements, while the other twenty-three women reported the time needed to reach orgasm was halved and noticed an improved quality of the vaginal tissue, a natural lubrication, greater hydration and a greater sensitivity of the vulva and the clitoris.
It was interesting noticing that patients were able to go immediately back to their normal life, including regular sexual activity.

This study was aimed to investigate how to treat vulvovaginal atrophy with Biodermogenesi®, a new non-invasive therapy particularly effective for skin regeneration, from stretch marks[45], post-surgical scars and burns[47]to the anti-aging treatments[46].
This therapy is often more preferable than other invasive methods.
In its previous fields of application Biodermogensi® has shown a significant increase in number of elastic fibres, an increased tissue hydrationand no side effects. These biological reactions would be extremely helpful in the treatment VVA allowing relevant therapeutic action.

MATERIALS AND METHODS

We involved ten patients aged from 51 to 79 (average age 64.5), all affected by VVA. The exclusion criteria applied during the first medical visit are as follows:

- oral therapy with estrogens or medicines responsible for the variation of vaginal secretion;
- menstrual cycle in the last 4 years;
- congenital genital anomalies;
- positive PAP test performed no more than 6 months earlier;
- vaginal infections in progress;
- Sjogren's syndrome diagnosis;
- overflow incontinence due to either poor bladder contraction or blockage of the urethra;
- cancer therapy in the last 5 years;
- epilepsy;
- have peace-maker;
- anorexia or bulimia in the last 2 years.

Ten patients have been subjected to a cycle of eight weekly sessions (average days between sessions 7,53) of FOEMINA, an aesthetic and functional gynaecologic treatment by Biodermogenesi®.
The same operator performed all the sessions based on a specified approach, timing and standard manoeuvres.
After the sessions patients were asked to evaluate their VVA symptoms from 0 to 5 (see table legend). The symptoms took in consideration were dyspareunia, irritation, vaginal dryness, tonicity of the mons pubis labia minora and labia majora, blood loss and incontinence.
From a clinical point of view, we also have visually evaluated from 0 to 5 the atrophy of the mons pubis and of the majora and minora lips, the evidence of capillaries on the genitals and the vaginal secretions performing the Schirmer's test, introducing the strip for few minutes in the vulvar vestibule for two minutes (see table legend).

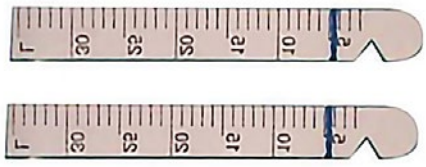
As you can see in the tables below, T0 means before the first session, T1 seven days after the first session, T2 seven days after the fourth session, T3 seven days after the eighth session and T3 + 3M are the value three months after the eighth session.
Value ranges from 0 to 5, descriptions below.

Subjective assessmentof the patient:

Disorder	*Values Description*
introital dyspareunia	**0 = no pain / 5 = maximum pain experienced**
vaginal irritation	**0 = no pain / 5 = maximum pain experienced**
vaginal dryness	**0 = no dryness and good secretion / 5 = maximum dryness and no secretions**
vaginal atrophy	**0 = no atrophy / 5 = maximum atrophy**
blood loss	**0 = no blood loss / 1 = a few blooddrops / 2 = continuous blood drops 3 = constant and moderate blood loss / 4 = significantblood loss 5 = blood loss similar to menstruation**
urinary loss	**0 = no urinary loss/ 1 = some drops of urine due to coughing or sneezing 2 = a few drops of urine under muscular effort / 3 = a few drops of urine without effort / 4 = consistent loss of urine / 5 = total incontinence**

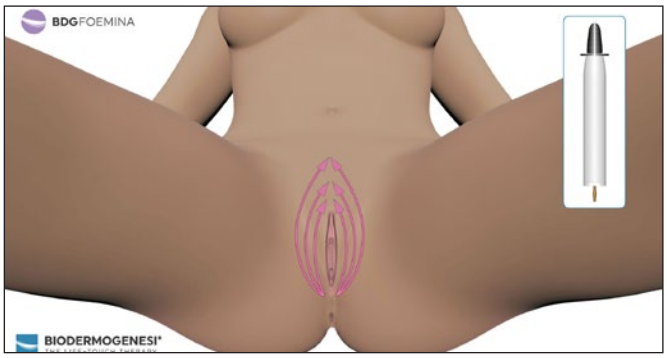
Clinical evaluation of the doctor:

Disorder	*Values Description*
vaginal atrophy	**0 = no atrophy / 5 = maximum atrophy**
vaginal dryness	performed with Schirmer's test for 2 minutes, introducing the strip upat 1 cm in the vaginal vestibule: **0 = Over 25 / 1 = from 21 to 25 / 2 = from 16 to 20 / 3 = from 11 to 15 / 4 = from 6 to 10 / 5 = from 0 to 5**
blood vessels	**0 = no capillary visible to the naked eye / 1 = some red capillary visible / 2 = capillaries no more than 5 mm. / 3 = capillaries over 5 mm. / 4 = capillaries over 5 mm. bleeding touching the zone / 5 = capillaries over 5 mm. bleeding without stimulation**

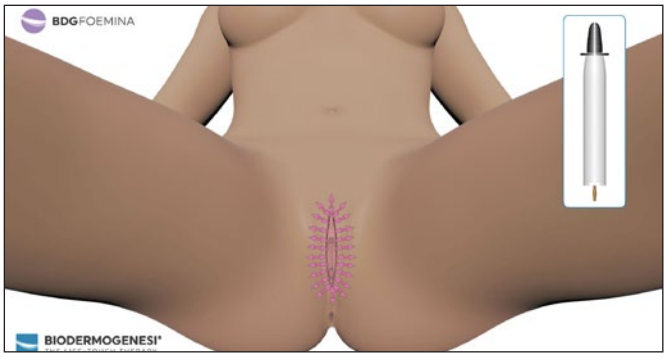


Schirmer's Test

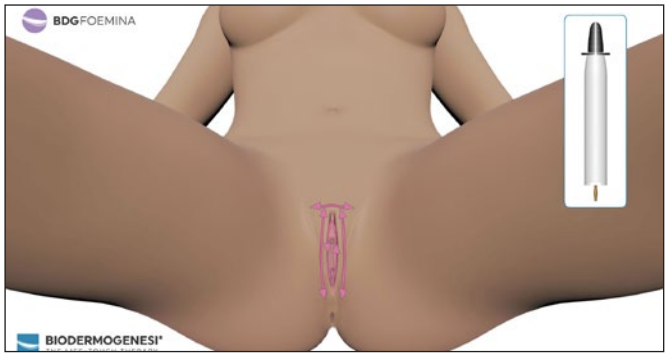
Biodermogenesi® treatment is composed of two main phases. The first one, called STIM, consists of an electroporation at 10 Hz, 700/800 mV max. This phase is performed by the STIM handpiece equipped with an interchangeable ogival tip AISI 3016, ISO 10993 certification and a steel separator ring. Both can be interchanged and sterilized in an autoclave. In compliance with the official protocols, the STIM of the Biodermogenesi® FOEMINA program includes the stimulation of the female genitalia, the pubic region and, subsequently, the abdomen during the ACTIVE phase.



Pict. 1 – first STIM movement ending on mons pubis



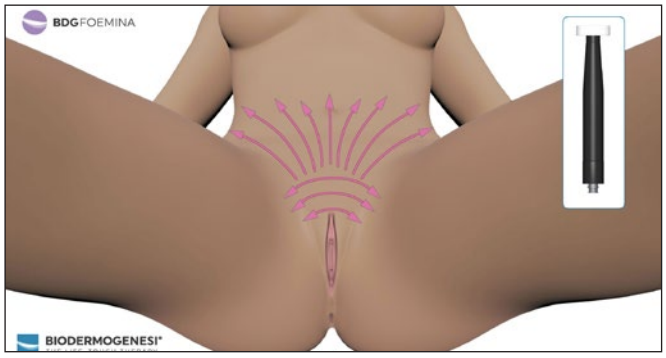
Pict. 2 – second STIM movement on labia majora and minora



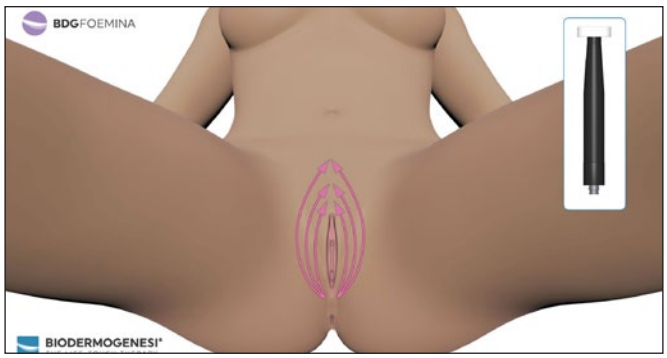
Pict. 3 – third STIM movement – vaginal stimulation

Images 1, 2 and 3 show the movements for the STIM phase: the first movement (picture 1) involves the mons pubis, the second one (picture 2) the labia minora and majora, while the third (picture 3) the introitus and the first centimetres of the vaginal canal.The separator ring allows to precisely measure the introduction of the ogive tip. The STIM phase takes from ten to twenty minutes, during which the three manoeuvres described above are repeated for two complete cycles.

Once the STIM phase is completed, the second phase ACTIVE is performed by a different handpiece with a shielded electrode terminal, able to transform the capacitive radiofrequency into an electromagnetic field. On the top, single-use certified ISO 10993 disposable cover, that guarantees the best diffusion of the energy produced[46].

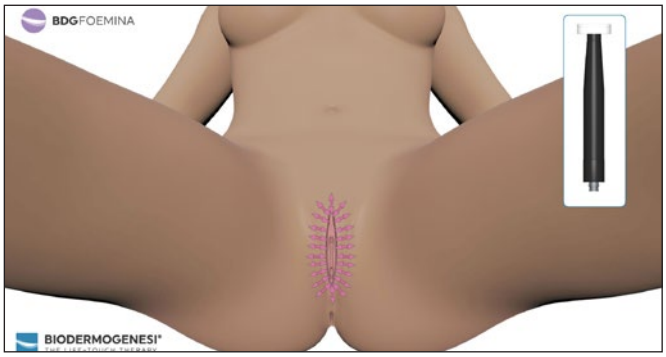


Pict. 4 – first ACTIVE movement on the lower abdomen



Pict. 5 – second ACTIVE movement

Images 4 and 5 show how the movements are extended to the whole lower abdomen. Among the various studies and publications about the action of Biodermogenesi® the Dermatology School of Pisa University[45] presented a study showing the efficacy of this treatment through biopsies and echography and reporting a qualitative and quantitative improvement of the elastic fibers of the treated tissue. Therefore, the extension of the movements up to the abdomen is necessary to increase the turgidity and the firmness, reducing the relaxed skin on the abdominal and pubic area, which collapse involves the genital organs. We believe that firming up the abdominal and pelvic floor tissues allows the repositioning of the vagina, followed by a significant aesthetic and functional improvements.



Pict. 6 – third ACTIVE movement on labia majora and minora

Image 6 shows the manoeuvre for the labia minora and majora, starting from the introitus and moving outwards. During the sixth manoeuvre the area involved are the first centimetres of the vaginal vestibule; the tissue is stimulated with electromagnetic fields for two or three minutes. The ACTIVE phase requires from ten to twenty minutes, the three manoeuvres described above are repeated for two complete cycles.

At the end of the eight sessions we spent other three months elaborating the results reported in two tables and comparing the clinical objective evaluation from the doctor's point of view and the subjective evaluation of the patients.

Doctors' Evaluation:

Patient: **A. A. - 71 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	3	2	2	1	1
Lubrication	2	3	4	5	5
Blood vessel	3	2	1	0	0

Patient: **B. A. - 62 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	4	4	3	2	2
Lubrication	1	2	3	4	4
Blood vessel	2	2	1	1	1

Patient: **B. C. - 79 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	3	3	2	1	1
Lubrication	0	1	3	4	4
Blood vessel	2	2	1	0	0

Patient: **P. G. - 71 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	3	2	1	0	0
Lubrication	1	1	3	4	4
Blood vessel	4	3	2	1	1

Patient: **C. A. - 63 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	3	2	2	0	0
Lubrication	0	1	2	4	4
Blood vessel	3	3	2	0	0

Patient: **D. A. - 58 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	4	4	3	1	1
Lubrication	2	2	4	5	5
Blood vessel	2	2	2	2	2

Patient: **T. C. - 51 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	4	3	2	1	1
Lubrication	2	2	3	4	4
Blood vessel	3	3	3	1	1

Patient: **G. A. - 55 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	3	3	3	1	1
Lubrication	1	2	3	4	4
Blood vessel	2	1	0	0	0

Patient: **B. A. - 64 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	2	2	1	0	0
Lubrication	2	2	2	4	4
Blood vessel	3	3	3	1	1

Patient: **C. M. - 71 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Atrophy	1	1	1	0	0
Lubrication	1	1	2	3	3
Blood vessel	2	2	2	0	0

Valutazione dei pazienti:

Patient: **A. A. - 71 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	5	4	2	0	0
Irritation	4	4	3	0	0
Lubrication	0	1	3	5	5
Atrophy	2	2	2	1	1
Bloodloss	0	0	0	0	0
Urinaryloss	1	1	0	0	0

Patient: **B. A. - 62 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	4	3	2	0	0
Irritation	3	3	2	1	1
Lubrication	0	0	2	4	4
Atrophy	3	3	1	0	0
Bloodloss	1	1	0	0	0
Urinaryloss	0	0	0	0	0

Patient: **B. C. - 79 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	5	5	3	0	0
Irritation	4	3	2	1	0
Lubrication	1	2	4	5	5
Atrophy	4	4	1	1	1
Bloodloss	0	0	0	0	0
Urinaryloss	0	0	0	0	0

Patient: **P. G. - 71 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	4	4	2	0	0
Irritation	5	4	2	1	1
Lubrication	2	2	4	5	4
Atrophy	3	3	1	1	1
Bloodloss	2	2	0	0	0
Urinaryloss	1	0	0	0	0

Patient: **C. A. - 63 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	5	4	2	0	0
Irritation	5	5	1	0	0
Lubrication	2	2	4	4	4
Atrophy	3	3	2	0	0
Bloodloss	3	2	1	0	0
Urinaryloss	2	2	0	0	0

Patient: **D. A. - 58 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	5	4	2	0	0
Irritation	4	4	2	0	0
Lubrication	0	1	2	5	5
Atrophy	2	3	2	0	0
Bloodloss	0	0	1	0	0
Urinaryloss	0	0	0	0	0

Patient: **T. C. - 51 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	4	4	2	0	0
Irritation	5	5	3	0	0
Lubrication	0	1	3	5	5
Atrophy	4	4	1	0	0
Bloodloss	1	1	0	0	0
Urinaryloss	1	1	0	0	0

Patient: **G. A. - 55 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	4	3	2	0	0
Irritation	4	3	1	0	0
Lubrication	1	2	3	5	5
Atrophy	4	4	2	1	1
Bloodloss	1	1	0	0	0
Urinaryloss	2	1	0	0	0

Patient: **B. A. - 64 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	3	3	2	0	0
Irritation	3	3	1	0	0
Lubrication	2	2	3	4	4
Atrophy	3	4	1	1	1
Bloodloss	2	2	0	0	0
Urinaryloss	2	1	0	0	0

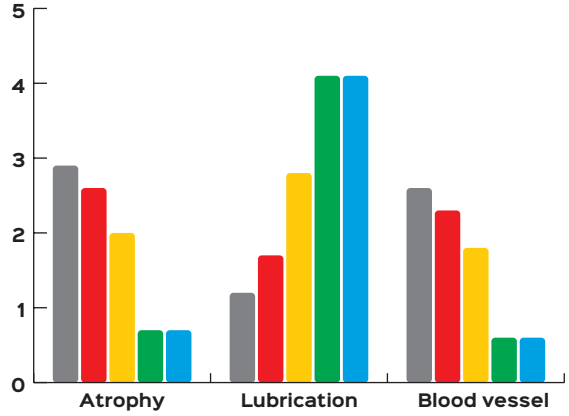
Patient: **C. M. - 71 y.o.**

Data	T0	T2	T2	T3	T3 + 3M
Dyspareunia	3	2	1	1	1
Irritation	3	3	1	1	1
Lubrication	2	3	4	4	4
Atrophy	3	3	2	0	0
Bloodloss	1	1	0	0	0
Urinaryloss	2	1	0	0	0

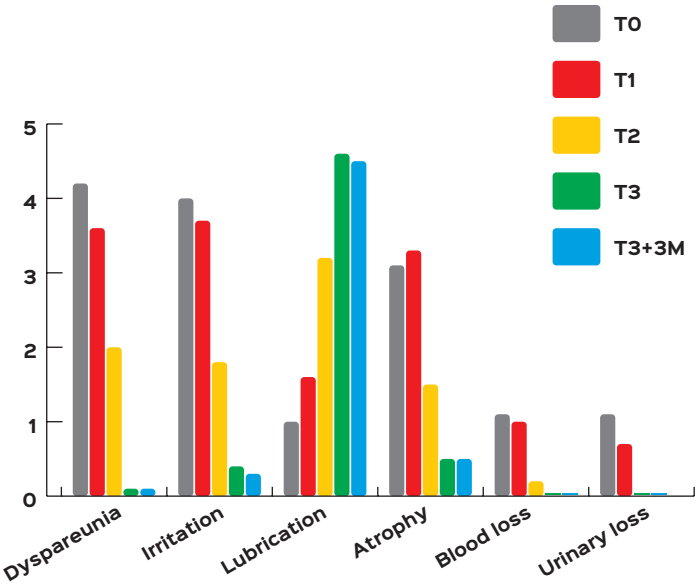
FOLLOW UP

Patient	Age	Satisfac-tion	Do you recom-mend it?	Pain
A.A.	**71**	**98**	**Yes**	**0**
B.A.	**62**	**97**	**Yes**	**0**
B.C	**79**	**99**	**Yes**	**0**
P.G.	**71**	**98**	**Yes**	**0**
C.A.	**63**	**99**	**Yes**	**0**
D.A.	**58**	**96**	**Yes**	**0**
T.C.	**51**	**99**	**Yes**	**0**
G.A	**55**	**98**	**Yes**	**0**
B.A.	**64**	**99**	**Yes**	**0**
C.M.	**71**	**96**	**Yes**	**1**

Average patients' satisfaction: 97,9%



Graph I: Vaule comparison of the doctor's evaluation



Graph II: Vaule comparison of the patient's evaluation

	T0	T1	T2	T3	T3+3M	Stability +3M
Atrophy	**2,9**	**2,6 / - 10,35%**	**2,0 / - 31,04%**	**0,7 / - 75,87%**	**0,7 / - 75,87%**	**100%**
Lubrication	**1,2**	**1,7 / + 41,66%**	**2,8 / + 133,3%**	**4,1 / + 241,6%**	**4,1 / + 241,6%**	**100%**
Urinaryloss	**2,6**	**2,3 / - 11,54%**	**1,8 / - 30,77%**	**0,6 / - 76,93%**	**0,6 / - 76,93%**	**100%**

Table I: Summary table of the doctor's evaluation

	T0	T1	T2	T3	T3+3M	Stability +3M
Dyspareunia	**4,2**	**3,6 / - 14,29%**	**2,0 / - 52,39%**	**0,1 / - 97,62%**	**0,1 / - 97,62%**	**100%**
Irritation	**4,0**	**3,7 / - 7,50%**	**1,8 / - 55,00%**	**0,4 / - 90,00%**	**0,3 / - 92,50%**	**102,77%**
Lubrication	**1,0**	**1,6 / + 60,00%**	**3,2 / + 320,0%**	**4,6 / + 460,0%**	**4,5 / + 450,0%**	**97,82%**
Atrophy	**3,1**	**3,3 / + 6,45%**	**1,5 / - 51,62%**	**0,5 / - 83,88%**	**0,5 / - 83,88%**	**100%**
Bloodloss	**1,1**	**1,0 / - 9,10%**	**0,2 / - 81,82%**	**0,0 / - 100%**	**0,0 / - 100%**	**100%**
Urinaryloss	**1,1**	**0,7 / - 36,37%**	**0,0 / - 100%**	**0,0 / - 100%**	**0,0 / - 100 %**	**100%**

Table II: Summary table of the patients' evaluation

From the tables (table I: doctor's evaluation, table II: patients' evaluation), appears immediately clear the macroscopic change obtained since the first session of the therapy. In the next seven days, patients reported a reduction of dyspareunia -14.29%, irritation -7.5%, lower blood loss -9.10%, incontinence -36.37 % and a slight increase of the vaginal lubrication+ 60% (data reported by the doctor with the Schirmer's test +41.66%).

Doctor and patients had just a different point of view regarding vaginal atrophy. According to the patients, there was an increase of about 6.45% after the first session; the doctor, instead, observed an increase of 10.35%.
In the further observations conducted a week after the fourth session was possible to notice a clear attenuation of all the consequence of the VVA and significant improvement of clinical symptoms.
Patients also reported reduction in symptoms like dyspareunia, irritation, improvement in vaginal atrophy higher than 50%, a drastic reduction in blood loss (-81.82%) and total remission of incontinence, while vaginal lubrication registered a high increase of over 320%. This increase was confirmed again by the Schirmer's test (+ 133.3%).
The positive trend finds its full confirmation in the observation carried out a week after the eighth session, with an almost total remission of the dyspareunia (-97.62%) and irritation (-90.00%), a very strong attenuation of the vaginal atrophy (-83.88%), which is also confirmed by the doctor's evaluation (-75.87%). Vaginal lubrication continued to record a slight increase (+ 460%), also confirmed by the Schirmer's test with a very significant increase of the 241.6%. Patients also reported total remission of blood loss and incontinence.

From a clinical point of view, doctor's evaluation has provided significant data since the first session, with a reduction of the vaginal atrophy higher than 10%, of evidence of blood vessels and with a great increase of vaginal lubrication over 40%. These improvements have grown consistently until the fourth session, where they all appeared tripled, achieving after the eighth session a significant change. The atrophy decreased by 75.87%, while the evidence of capillaries decreased by 76.93%. At the same time vaginal lubrication increased by 241.6%.

All the the data remained constant at the further examination performed after three months from the end of the treatment cycle; doctor's observation remained exactly unchanged, while patients' evaluation showed a slight variation, more than 2%. Patients also expressed their overall level of appreciation about the therapy rating 97.9 on a scale ranging from 0 to 100. All subjects would also recommend the treatment to women affected by VVA.

Among all aspects highly appreciated by our patients, the improvement of the state of health of their genitals, the pleasantness of the treatment and the absolute absence of side effects and downtime played a key role.
Some patients also reported, they had sexual intercourse only a few hours after the treatment.

The relevance and uniformity of the results obtained, both from an aesthetic and structural point of view, the total absence of side effects and the stability of the effects after three months make us believe that FOEMINA Biodermogenesi® program represents a non-invasive, well tolerated and effective treatment for all alterations caused by VVA. Because of the low number of patients observed, the current study represents just a starting point, from which increase the number of subjects, observe and verify the effective duration of the benefits given by the treatment over the time.

Moreover, this treatment can be an excellent adjuvant treatment for women with incontinence up to the second level, giving an excellent response from the first session.

CONFLICT OF INTEREST

The author declares has no conflict of interests.

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