The penile erection is the result of a complex process bringing into play neurological, vascular, hormonal, muscular and psychological aspects. To speak today of the importance of the perineal muscle structure’s role in the sexual function, is to state the obvious, having already learned so much about the possible interactions of this anatomical region throughout uro gynaecological rehabilitation. Beyond the simple functional aspect, the notion of perineal interactivity during sexual relations calls for a clearer explanation.

The etymology

Anatomically speaking, the pelvic floor - perineum - is described as being situated in the bottom part of the pelvis, and can be defined as being «the whole of the soft parts placed beneath the pelvic diaphragm of the levator muscles» (1)

Etymologically speaking, the pelvic floor - perineum - is described as the region «where the scrotum is situated» (one may note this particularity) and, by extension, the external male and female genital organs are interdependantly attached to it.

Perineum in latin, comes from the greek perineos, and one say may be even derived from peris which means quite simply scrotum, leading us once again to a male baptism, even from perinaos which is composed in peri (around) and Naos (heart-place where the sacred is in a temple). If we restrict ourselves to first the strict etymological definition, the female perineum does not exist, being, as we know, deprived of a scrotum.

Personally I’ve searched the real greek origin of this perineos and I’m sure right now that it is coming from the greek word perineos “περινέος” which recognized in the greek BAYLET dictionary as composed of peri “περί” which means around and ineo “ινεό” which means to spread around, which is spread around.

Its latin anatomical name is « diaphragma urogenitalis ». However, it would be an insult to the female kind if one was to deny the existence of the perineum, notably for the reasons which we shall evoke later on.
Apart from the urological, gynaecological or anorectal roles which are now well-established and perfectly understood, the perineal function has also acquired a certain importance in the sexual mechanism. We shall avoid any detailed anatomical description already well-known by specialists in urogynaecology and other perineal disorders, and shall only retain a few secondary elements which are nevertheless important in the understanding of the sexual perineum.

May we, simply, point out that the front female perineum is of much more fragile constitution than the male perineum, that the vulva takes up practically all the space, and of which the most important orifice is the vagina.

In fact is there a male & female sexual perineal mechanism concept?

**Female sexual pelvic floor concept**

The vulvar slit (rima pudendi) is surrounded by the labia majora (labium majus pudendi), and, just inside the labia majora, the labia minora or nymphae (labium minus pudendi), which join together to form the hood of the clitoris, equivalent of the male penis.

The clitoris is composed of a body (corpus clitoridis) named also the clitoral shaft, in front of which is situated the frenulum clitoridis. Suffice it to say that this terminology draws a parallel with that of the male organ.

What is more, the clitoris ends in a rounded tip named the clitoral glans (glans clitoridis). The whole of this body is rich in sensitive nervous endings.

We shall conclude this summary with a presentation of the muscles which contribute to the sexual mechanism.

At the lower outer level of the front perineum we find:
- the ischio-cavernosa (ischio-cavernosus)
- the bulbo-cavernosa (bulbo-spongiosus)
- the vulvar constrictor (tunica muscularis vaginae) for the only female, with the vulva and the vagina.

In the ischio-rectal cavity and the back perineum we distinguish:
- above: the levator ani muscle (musculus levator ani)
- below: the external anal sphincter (musculus sphincter ani externus)

**Ischio-cavernosa muscle**

This muscle encourages the clitoris’s erection by compressing the cavernous body and driving the blood towards the clitoris. During the sexual act it also lowers the clitoris, bringing the glans against the back of the penis.

**Bulbo-cavernosa muscle**

This muscle's action is quite complex. Its first role is in the erection (by its compression of the bulb), driving the blood towards the clitoris. But it also indirectly affects the musculus compressor venae dorsalis by compressing the dorsal vein of
the clitoris. Additionally, this muscle compresses the Bartholin's glands, stimulating the flow of its liquid which lubricates the vulvar vestibule, facilitating penile penetration.

The vulvar constrictor
This muscle's principal role is the reduction of the lower vaginal orifice. Its contraction reflex is responsible for the lower vaginismus, in this case in synergy with the bulbo-cavernous muscle, the levators ani and eventually the adductors. We can therefore note that all the superficial muscles of the lower perineum, besides the tightening of the vulvar entrance, contribute to the rubbing of the clitoris against the rigid penis during penetration and during up and down penile movement. By contracting, this muscle reduces the lower vaginal orifice. Lastly, it too contributes to the lowering of the clitoris, helping its application against the back of the penis.

The levator ani muscles
This muscle shall therefore be considered as a whole. Its role, particularly in the elevator function, is evident during copulation, on condition that it is of good quality. Numerous authors (2) have already stressed the importance of this muscle's role. A study I made in 1985 (3) confirmed that the application of pelvi-perineal rehabilitation sessions in women complaining of frigidity brought about a clear improvement in the quality of their sexual relations.

The anal sphincter
We shall note that this muscle works in synergy with the levator ani muscle.

The vagina
This is the copulation organ, a musculo-membranous channel, solidly attached to the levator floor. Its front and back walls are practically joined together, making a virtual cavity. Its average length is 8 cm which can vary from 4 to 14 cms. Its suppleness and elasticity mean that it can adapt to any content, quite whatever this may be. As a whole, the vagina follows a postero-inferior concave curve which straightens up during coitus (copulation). Simultaneously, the back wall lengthens and depresses. This depression is increased by contraction of the levator ani muscles. Finally the vaginal mucous membrane is the center of important transudation during the initial phase of coitus.

Male sexual pelvic floor concept
We shall not describe in too much detail the male erectile bodies, but shall simply evoke the following elements:
- the cavernosa body of the penis (corpus cavernosus penis), two in total, which are responsible for rigidity.
- the frenulum penis
- the glans penis
- the spongiosa body (corpus spongiosus) single and median to the ventral side of the penis

**Male Ischio-cavernosa muscle**
The external tract of this muscle surrounds the lower part of the cavernous body and forms, by joining the opposite tract, the Muller's pubo-cavernous muscle. Its action on the maintenance of penile rigidity was proven in 1988 (4), in the journal of urology.

**Male Bulbo-cavernosa muscle**
This muscle's interest resides in the terminal part of its foremost fibers. Its two tracts, by joining together, form a muscular arch (musculus compressor venae dorsalis penis) which ties the cavernous bodies to the back side of the penis. This is the equivalent of the female muscle described above. It compresses both the superficial and deep dorsal veins during the erection, encouraging blockage of the venous return.

**Male deep transverse of the perineum**
This muscle plays a role in the erection by compressing the veins of the erectile bodies and blocking the venous return.

**Male superficial transverse of the perineum**
Stimulant of the bulbo-cavernous muscle, this muscle acts essentially in the ejaculation.

**What about the sexual muscualrs action?**

**The Interactive & synergic perineal muscular activity**

We remember that the penile erection is the result of a complex process bringing into play neurological, vascular, hormonal, muscular and psychological aspects. A distinction is made between tumescence and rigidity.

We shall limit our attention to the aspects of rigidity and the interactive muscular synergy coming into play during its maintenance. We know (5) that the erection is due to a releasing of the smooth intracavernous muscle structure, to a dilation of the cavernous arteries which, by their input flow, increase the intracavernous pressure (ICP). We also know that the sub-tunica albuginea venous network is compressed by this intracavernous pressure (ICP), and that increased elevation is encouraged by the blockage of return.

However, if this model can explain an intracavernous pressure (ICP), which is low or at least equal to the systolic pressure, it cannot explain the intracavernous pressures which are higher than the supra-systolic pressure, as demonstrated by LAVOISIER (6). He concludes that the contractile role played by the perineal muscles in the
maintenance and the increase of intracavernous pressure, and consequently in the level of rigidity, is primordial. Amongst these muscles, a pre-eminent role is played (7) by the male bulbo and ischio-cavernosa muscles.

Studies carried out on animals, correlated with man, confirm the action played by the muscles.

Briefly speaking, we can note an increase in the intracavernous pressure (ICP) when the EMG activity of the bulbo and ischio-cavernous muscles is increased. In this way the intacavernous pressure can reach up to 10 times the level of the systolic pressure. We had in 1984, by means of the creation of a functional therapeutic strategy with some sexologists and urologists, established a rehabilitation work programme for dysfunctioning erections and premature ejaculation too (12).

The interest of some studies (4) & (6) and others (8), resides in the clinical and physiological underlining of what we believed concerning rehabilitation.

Further informations gathered from thees studies concerns the action of the ischio-cavernosa muscle. Effectively we were aware of the action of the bulbo-cavernosa (9) & (10) and the bulbo-cavernosa reflex was particularly well-understood. These recent studies have taught us that an ischio-cavernosa reflex which is not insignificant exists, and that a simple variation in pressure from 20 to 40 m/m HG (mercury) on the penis glans will release this reflex.

So what is the connection between the muscular activity and the rigidity?

We have evoked the action of the bulbo-cavernosa as a contributory factor to rigidity by blocking the venous return. We shall also underline the action of the ischio-cavernosa muscles which tighten around the perineal part of the cavernous bodies like a tyre around an inner tube (LAVOISIER). So, the vascular infra-systolic phase would therefore be that of tumescence - namely long-lasting weak rigidity - and the supra-systolic phase - namely short-lasting strong rigidity - would be that of the ischio-cavernosa muscles.

We can therefore conclude that to enable penetration it is necessary to increase the intracavernous pressure to a sufficient supra-systolic degree, and even more so if the peri-vaginal musculature and tonicity are stronger, requiring additional penetration effort. This therefore implies the notion of a penis / vagina muscular synergy.

We have noted that pressure applied on the penis glans has a muscular reflex effect which facilitates rigidity. During penetration this reflex is more or less activated depending on the quality of the peri-vaginal muscles, particularly at the level of the junction between the external third and the internal two-thirds. The latest studies (11) made lead us to the confirmation that a series of pressures is made on the glans during penetration and withdrawal, at different vaginal levels, provoking a succession of intracavernous pressure peaks, favouring the erection's maintenance.

One can note:
· a peak at the vaginal entrance
· a peak at the junction between the external third and the internal two thirds
· a peak on contact with the cervix
· a peak at the beginning of withdrawal
· a peak during the passage of the aforementioned one third / two-thirds junction
· and so on during the up and down penile movement.

Relation between peaks and penile movements

Also, if we take into account the length of these pressure peaks - that is to say 2 to 2 seconds - the up and down penile movement should preferably be slow rather than fast for maximum rigidity maintenance. Slow movements generate higher pressures. From this viewpoint it is therefore clear that, on the one hand, the male bulbo and ischio-cavernosa musculature must be efficient and that the penile glans - spongy - must be sufficiently irrigated with sensitive nervous endings able to assure the concerned reflex and that, on the other hand, the peri-vaginal tonicity, the quality and the control of the female perineal muscles must be as perfect as possible. The convergence of these elements will provide a good lasting erection, improved sexual relations and considerable assistance in the quest for pleasure.

Conclusion

Pelvic floor rehabilitation has accustomed us to the evaluation of the female musculature’s functional quality. We have seen that this musculature, when it is of good quality, apart from its corrective action in urological, gynaecological, pelvi-perineal or digestive terminal disorders, has an important role to play in the copulation act, not only where female pleasure is concerned, but also, and above all, where the maintenance and the quality of the male erection is concerned.

It is for this reason that, in the case of sexological treatment for dyserection, in complement to the functional examination of the male pelvic floor, an investigation should be made of the partner’s functional musculature. This attitude is one which has been recommended by us for many years now.

If made systematically, a precise diagnostic of the opposing functionalities should enable an evaluation of the muscular deficiencies and the establishment of an efficient therapeutic programme bringing improvement both in rigidity and in the development of female pleasure.
Bibliography

1- BOUCHET, CUILLERET
Anatomie, le petit bassin, le périnée
SIMEP éditions

2- LAVOISIER P.
Rehabilitation for the circumvaginal musculature

3- VALERO, MAMBERTI-DIAS
Rééducation périnéale et dysfonctions sexuelles féminines
Contraception-fertilité-sexualité- 1985 -
Vol 13, N°11, pp 1161-1163

4- LAVOISIER, PROULX, COURTOIS, DE CARUFEL, DURAND.
Relationship between perineal muscles contractions, penile tumescence and penile rigidity during nocturnal erections.
J.Urol.1988a;139:176-179

5- KRANE, GOLSTEIN, SAENS DE TAJEDA
Impotence

6- LAVOISIER, PROULX, COURTOIS
Reflex contractions of the ischio-cavernosus muscles following electrical and pressures stimulations
J.Urol.1988b;139:396-399

7- MICHAL, SIMANA, REHAK, MASIN

8- KARAKAN, HIRSHKOWITZ, SALIS, NARTER, SAFI.
Penile blood flow and musculovascular events during sleep-related erections of middle-aged men
J.Urol.1987;138:177-181

9- RUSHWORTH
Diagnostic value of the electromiographic study of reflex activity in man.Neurophysiology L.WIDEN

10- ERTEKIN, REEL
Bulbocavernosus reflex in normal men and in patients with neurogenic bladder and/or impotence

11- LAVOISIER, SCHMIDT, ALOUI
Intracavernous pressure increases and perineal muscles contractions in response to pressure stimulations of the gland penis - Int.J.Impotence Res.1992;4:99.1-99.8
12- A. BOURCIER & Coll.
Le Plancher pelvien - VIGOT ed. Paris

13- AMARENCO, KERDRAON
Apport des investigations électrophysiologiques périnéales dans les dysfonctions érectiles d'origine neurologique
1st intern. symposium Andrology Bioeng. & sexual rehab. - 5/7/07/95 Paris

14- K. BOLAYIR, YEKT AOGLU, ULUCAY -
The rôle of sextherapy in the treatment of impotence
1st intern. symposium Andrology Bioeng. & sexual rehab. - 5/7/07/95 Paris

15- G. RALPHE, DE PALMA
Rehabilitation & medical management of vasculogenic impotence
1st intern. symposium Andrology Bioeng. & sexual rehab. - 5/7/07/95 Paris

16- SCHEIBER, Nogueira
Neurological disorders and impotence
1st intern. symposium Andrology Bioeng. & sexual rehab. - 5/7/07/95 Paris

17- WAGNER
Physiological considerations and erectile function
1st intern. symposium Andrology Bioeng. & sexual rehab. - 5/7/07/95 Paris

18- CLAES & BAERT
Pelvic floor exercise versus surgery in the treatment of impotence
British journal of urology (93) 71 / 52-57