Persistent Genital Arousal Disorder (PGAD) in Women: Mental or Body

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Disclosures

Consultant/Advisory Board: Apricus, Emotional Brain, Exploramed, Sprout, Strategic Science & Technologies

Speaker: Ascend, Shionogi

Research: Apricus, Neogyn

Learning objectives:

Characterize the underlying pathophysiologies leading to PGAD and thus direct therapeutic strategies more appropriately

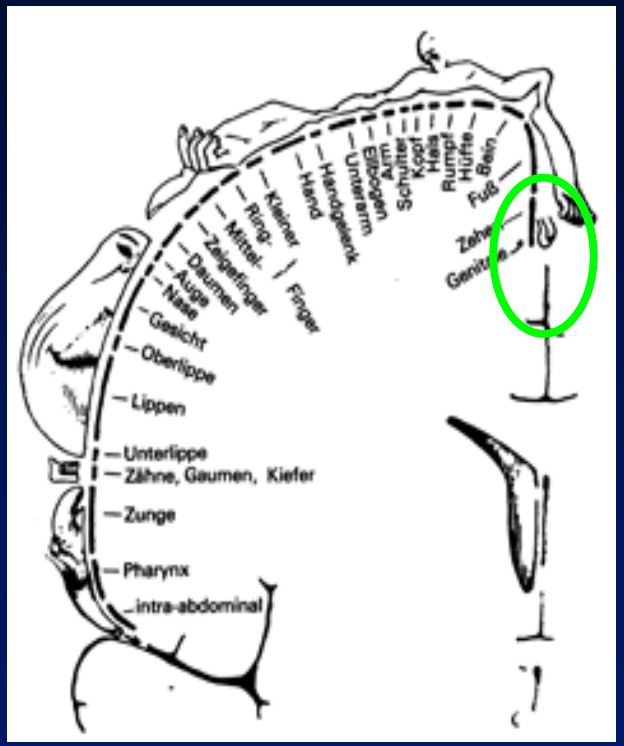
Persistent Genital Arousal Disorder (PGAD)

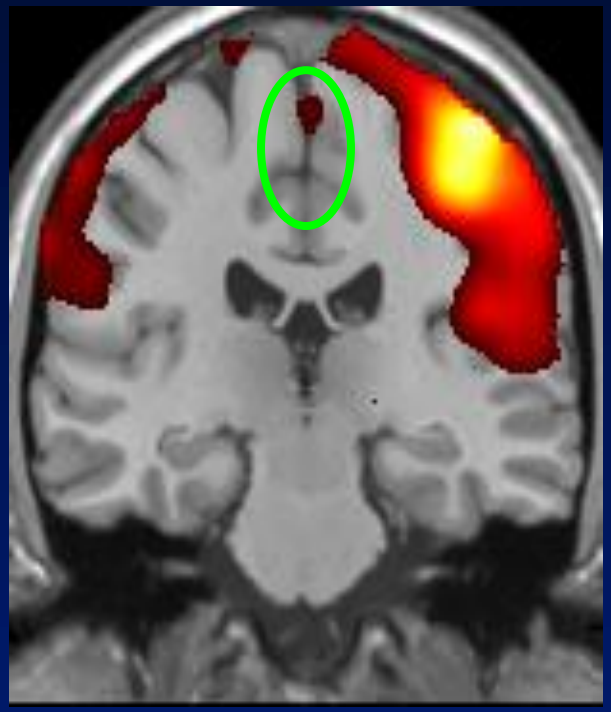
Persistent genital arousal disorder (PGAD) (formerly PSAS) is a rare, unwanted and intrusive sexual dysfunction associated with excessive and unremitting genital arousal and engorgement in the absence of sexual interest

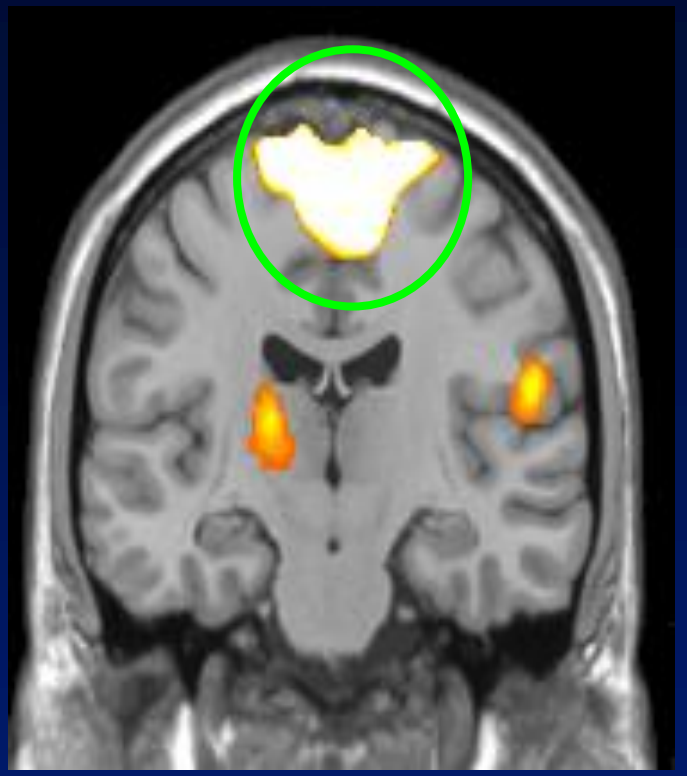
PGAD is extremely frustrating and can lead to suicidal ideation and attempts

The persistent genital arousal usually does not resolve with orgasm

Persistent Genital Arousal Disorder: during PGAD episode







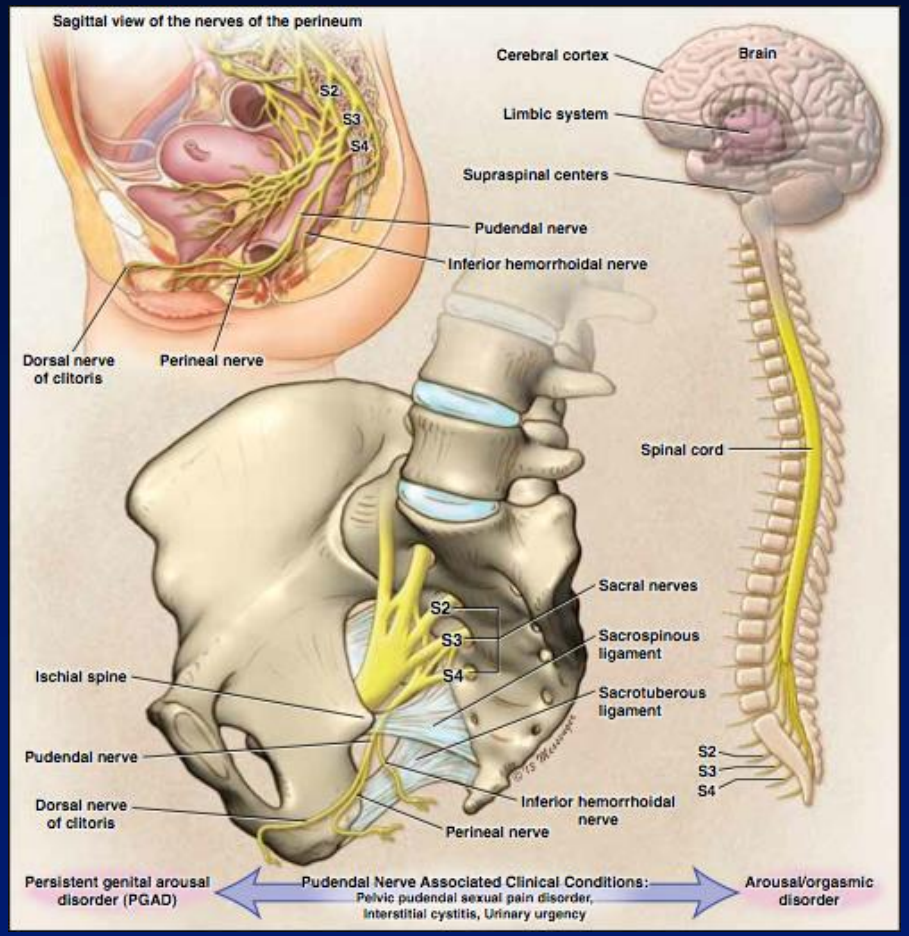
Homuncular genital representation

Normal clitoris projection

PGAD attack

Persistent Genital Arousal Disorder (PGAD)

It is probable that PGAD exists because of excess sensory information passing from a number of peripheral genital pathologies or local central nervous system pathologies, (S2, S3, S4)



It is probable that PGAD exists because of decreased inhibition of the excess information along the lateral spinothalamic tract, thalamus, and hypothalamus

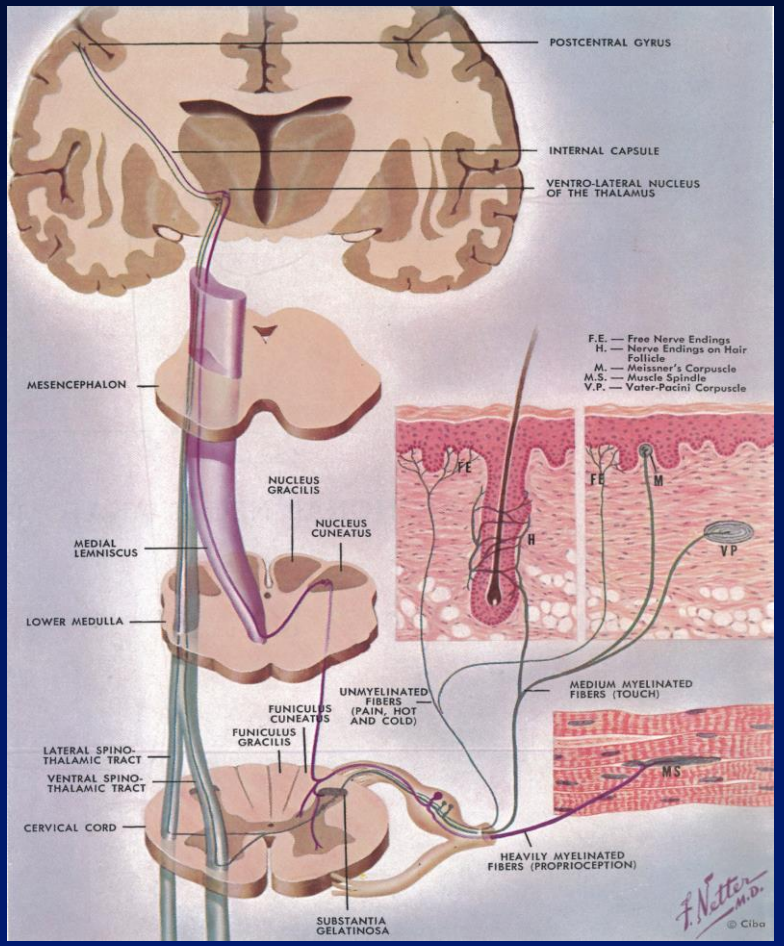
Lateral Spinothalamic Tract

The lateral spinothalamic tract is a sensory pathway originating in the spinal cord

The lateral spinothalamic tract transmits afferent information to the **first order relay area - the thalamus** - about pain, temperature, itch and crude touch

The types of sensory information transmitted via the lateral spinothalamic tract are described as **“affective sensation”** - the sensation is accompanied by **a compulsion to act**

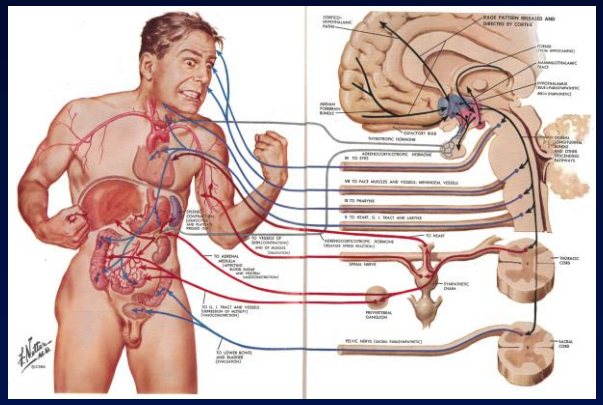
For instance, an itch is accompanied by a need to scratch, and a painful stimulus makes one want to withdraw from the pain

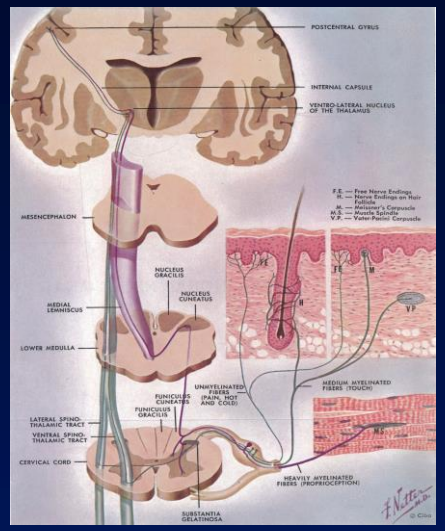


Lateral Spinothalamic Tract

Facial grimaces of pain and the facial grimaces of orgasm are common

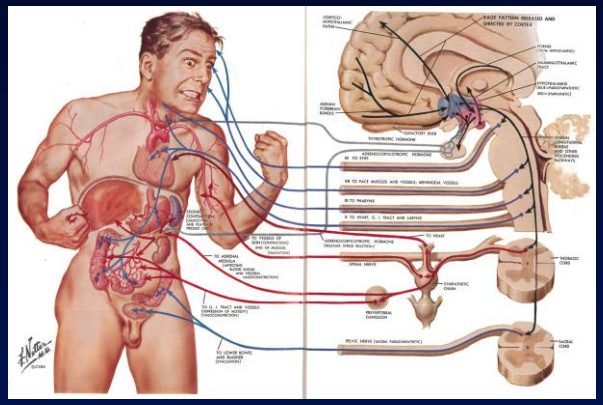
Vocal sounds of pain and vocal sounds of orgasm are common

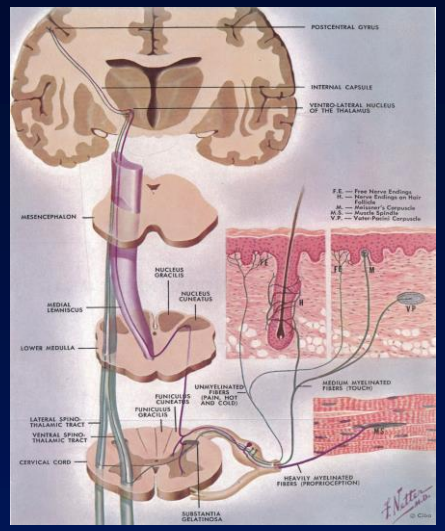




Lateral Spinothalamic Tract

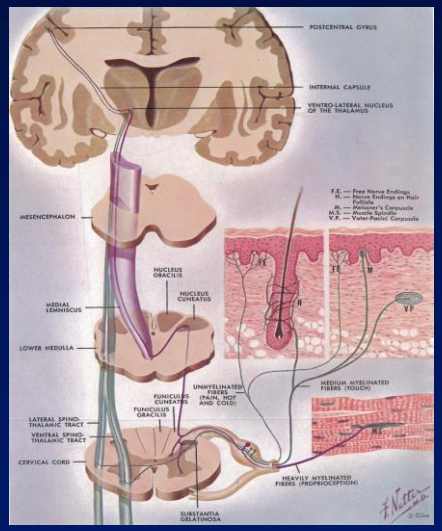
It likely that pain and sexual arousal/orgasm are BOTH "affective sensations" that BOTH pass to the first order relay area - the thalamus via the lateral spinothalamic tract.

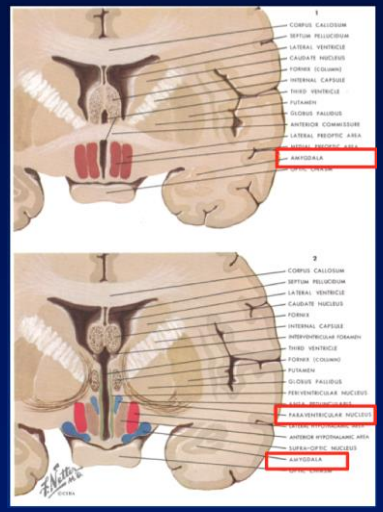




Lateral Spinothalamic Tract

Sexual arousal/orgasm information then passes from the **first order relay area, thalamus**, to **second order relay area, hypothalamus** - specifically to nucleus accumbens, amygdala, hippocampus, the paraventricular nucleus of the hypothalamus and ventral tegmentum





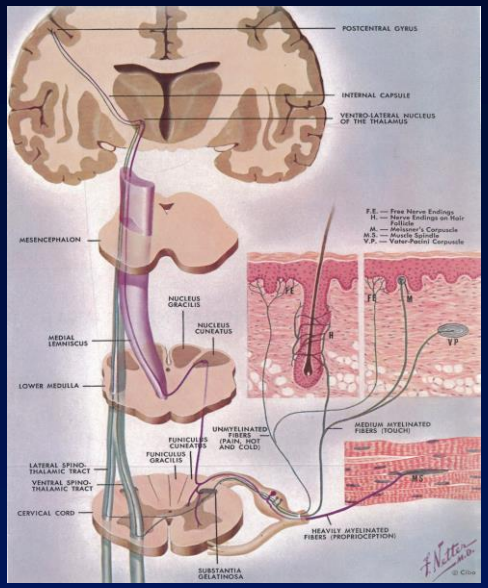
Second Order Relay Area Hypothalmus:
Nucleus accumbens
Amygdala
Hippocampus
Paraventricular nucleus of the hypothalamus
Ventral tegmentum

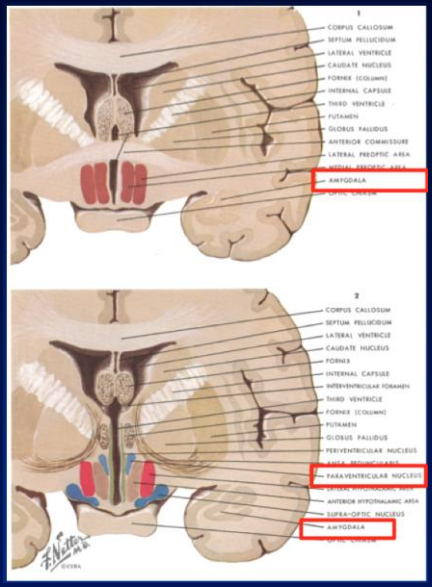
Lateral Spinothalamic Tract

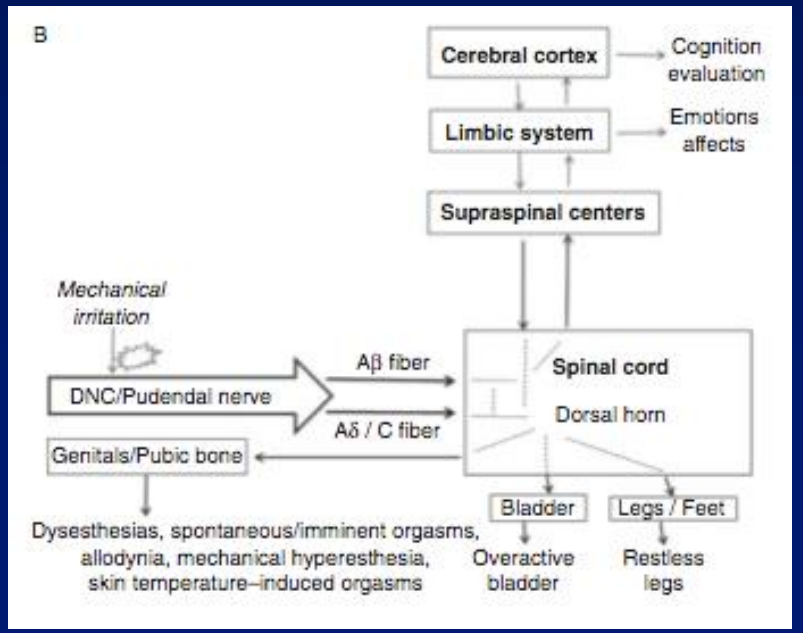
It is probable that PGAD exists because of excess sensory information passing from a number of peripheral genital pathologies or local central nervous system pathologies, (S2, S3, S4)

The excess sensory information passes along the lateral spinothalamic tract to the first order relay area, thalamus, and then inadvertently to the second order relay area, hypothalamus

The brain misinterprets the excess information as sexual arousal/orgasm







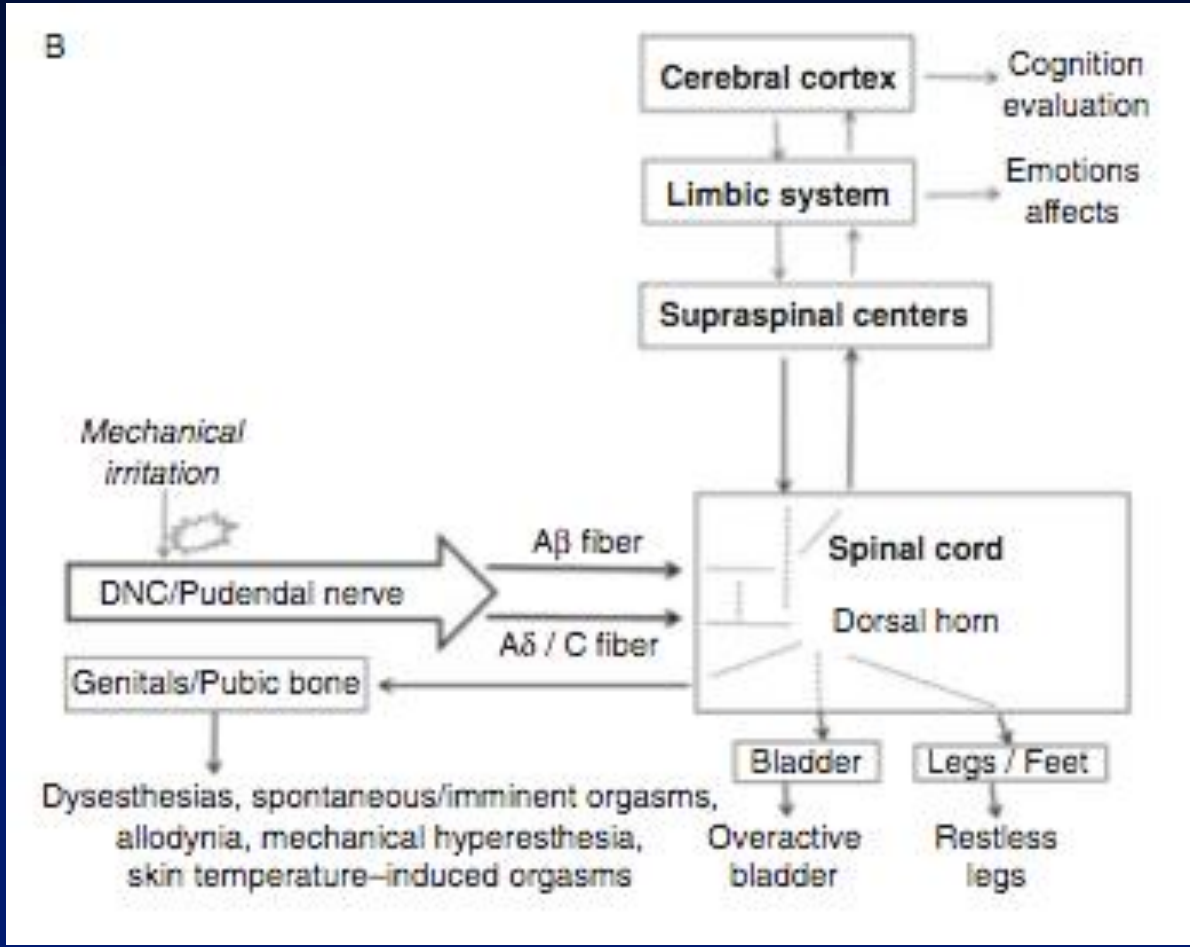
Persistent Genital Arousal Disorder (PGAD)

In PGAD there are often concomitant secondary symptoms (may be related in part to associated high tone pelvic floor dysfunction):

Bladder (urinary frequency, urinary urgency) problems

Bowel (irritable bowel) problems

Restless leg problems



Excess sensory information passing from a number of peripheral genital pathologies or local central nervous system pathologies, (S2, S3, S4)

a) altered pre-menopausal hormone integrity – hormonally mediated provoked vestibulodynia
b) altered menopausal hormone integrity – vulvovaginal atrophy/genitourinary syndrome of menopause
c) increased nerve fiber density - genetic susceptibility leading to elevated levels of nerve growth factor substances
d) an injury to, or irritation of, the pudendal nerves that transmit pain and other sensations
e) abnormal response of tissues to Candida infection, or recognized allergies or non-specific allergies
f) dermatologic conditions: lichen sclerosus or lichen planus
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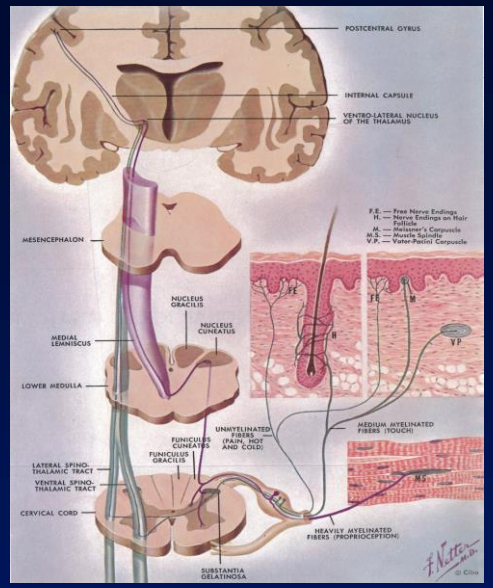
Lateral Spinothalamic Tract

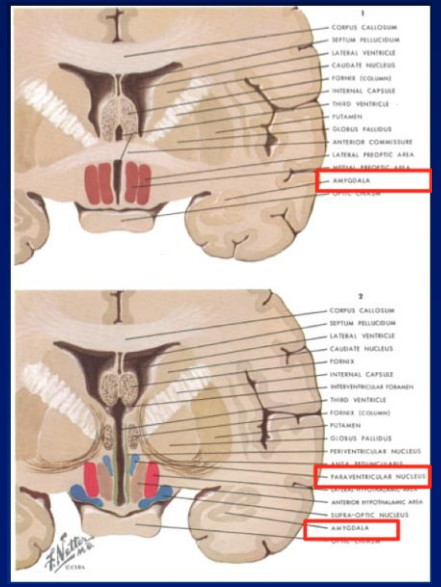
The keys to treatment of PGAD:

1. REDUCE the excess peripheral sensory input from peripheral genital pathologies or local central nervous system pathologies, (S2, S3, S4)

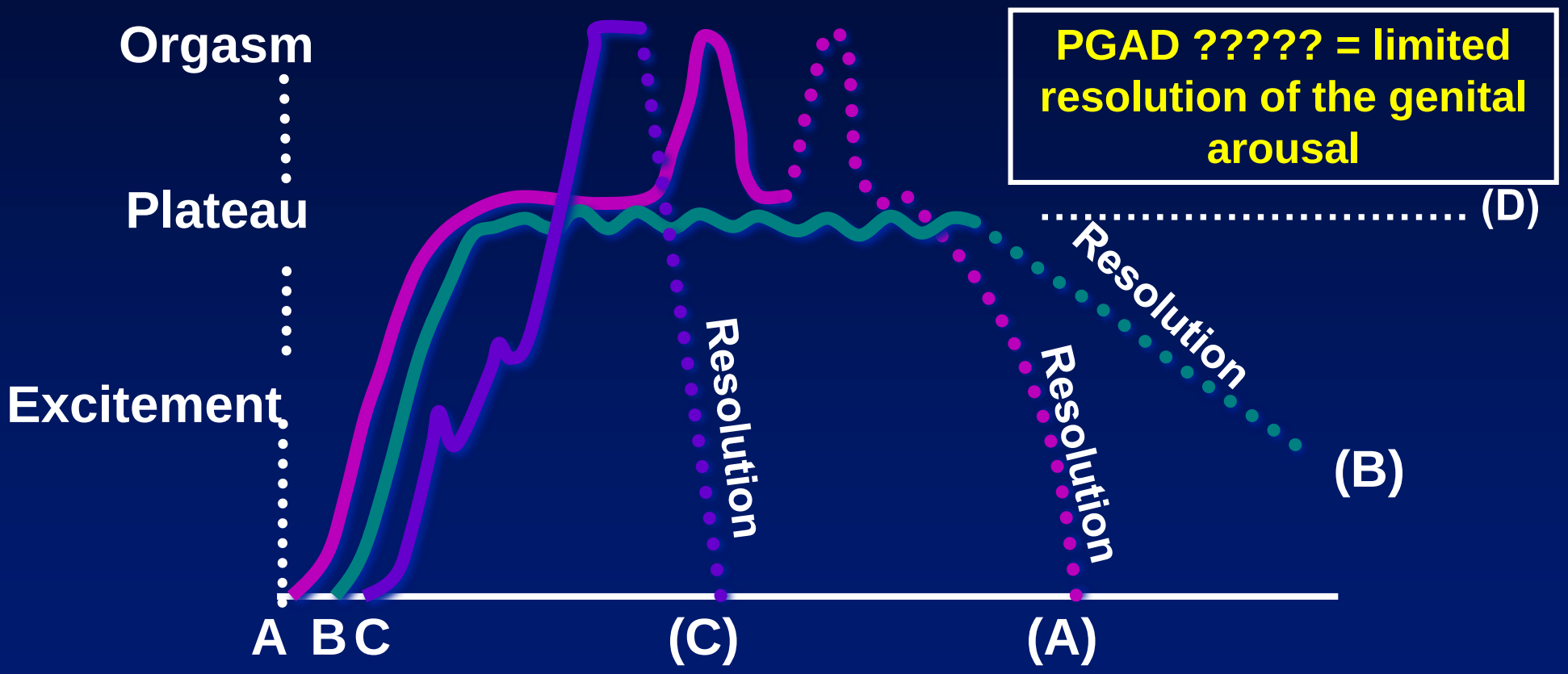
2. INCREASE inhibition of the excess information along the lateral spinothalamic tract

Successful PGAD management utilizes BOTH strategies - to keep the PGAD condition manageable





Female Sexual Response Cycle



Adapted from Masters WH, Johnson VE. *Human Sexual Inadequacy*. Little Brown; 1970.

EDITORIAL

IRWIN GOLDSTEIN, MD
Editor-in-Chief

2357

Persistent Genital Arousal Disorder—Update on the Monster Sexual Dysfunction

J Sex Med 2013;10:2357–2358

1. **PGAD is not so rare—I personally have spoken with and/or cared for well over 100 women and men with PGAD. I have asked healthcare providers at numerous sexual meetings to raise their hands if they have cared for individuals with PGAD and under most situations, approaching 1 in 4 or 5 providers have managed such patients.**

2. **PGAD can be cured—We have several patients diagnosed with PGAD who are no longer suicidal or bothered/distressed after treatment(s).**

Persistent Genital Arousal Disorder (PGAD)

It takes a lot of courage to tell the world I have PGAD. It is something we don't talk about. It's a secret. If someone were to find out, we could be ridiculed and sexually harassed for the rest of our lives. Some of us don't even tell our spouses due to the fact that we're afraid that they will leave us.

PGAD can last for hours or days with no relief; it is unrelenting and unwanted. It causes a lot of suffering and is often associated with social withdrawal and suicidal thoughts and plans–at one time I had plans. I am very lucky to be standing here today. I was bed ridden. I could not ride in a car; the thought of even getting in a car was unthinkable, as the vibration from driving would stimulate the PGAD. I couldn't wear tight clothing or even underwear. I wore only dresses so nothing would touch me and aggravate my PGAD. I couldn't carry out my regular household duties, cooking, cleaning, washing clothes. Just walking would trigger my PGAD. It is embarrassing and humiliating. I had to be near a bathroom at all times. It caused me to not want to live.

Persistent Genital Arousal Disorder (PGAD)

There are no recognized safe and effective evidence-based treatments

Most physicians are uninformed and unaware of PGAD

No animal models of PGAD yet exist

Primary versus acquired

Biopsychosocial pathophysiologies –

- **Psychologic – especially STRESS**
- **Musculoskeletal**
- **Hormonal**
- **Vascular**
- **Neurological**
- **Pharmacologic Causes**

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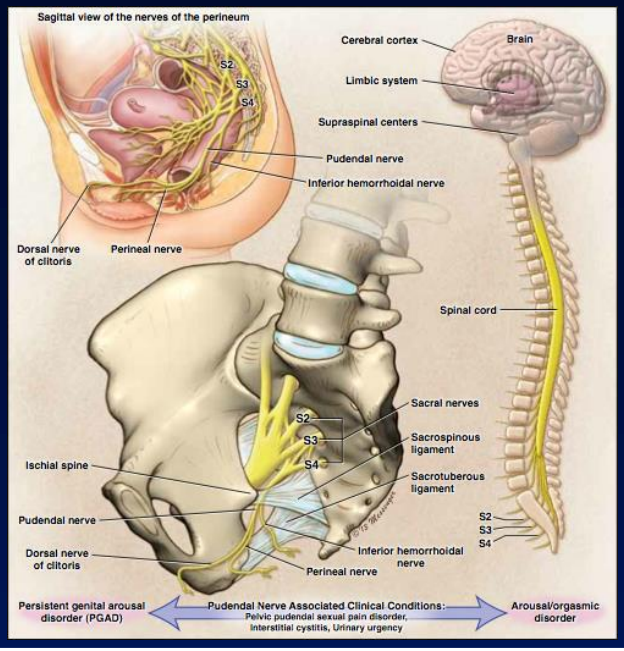

It is probable that PGAD exists because of decreased inhibition of the excess information centrally along the lateral spinothalamic tract, thalamus and hypothalamus

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1. REDUCE the excess peripheral sensory input from peripheral genital pathologies or local central nervous system pathologies, (S2, S3, S4)

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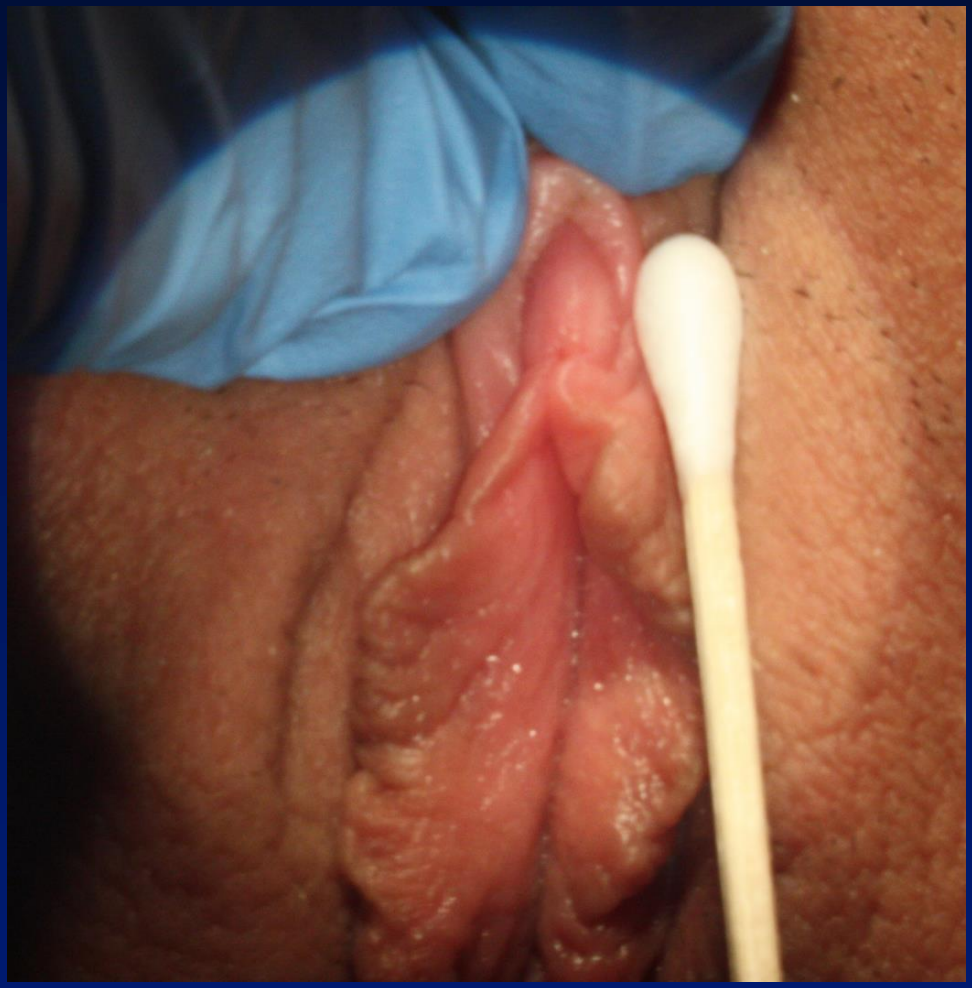
Successful PGAD management utilizes BOTH strategies - to keep the PGAD condition manageable

Persistent Genital Arousal Disorder (PGAD)

PGAD symptoms include:

Persistent perception that the clitoris, labia, vagina are engorged and throbbing and are fully sexually aroused - even though there is no sexual stimulation

Physical examination locally does not usually show local clitoral, labial or vaginal engorgement – despite thepresence of PGAD



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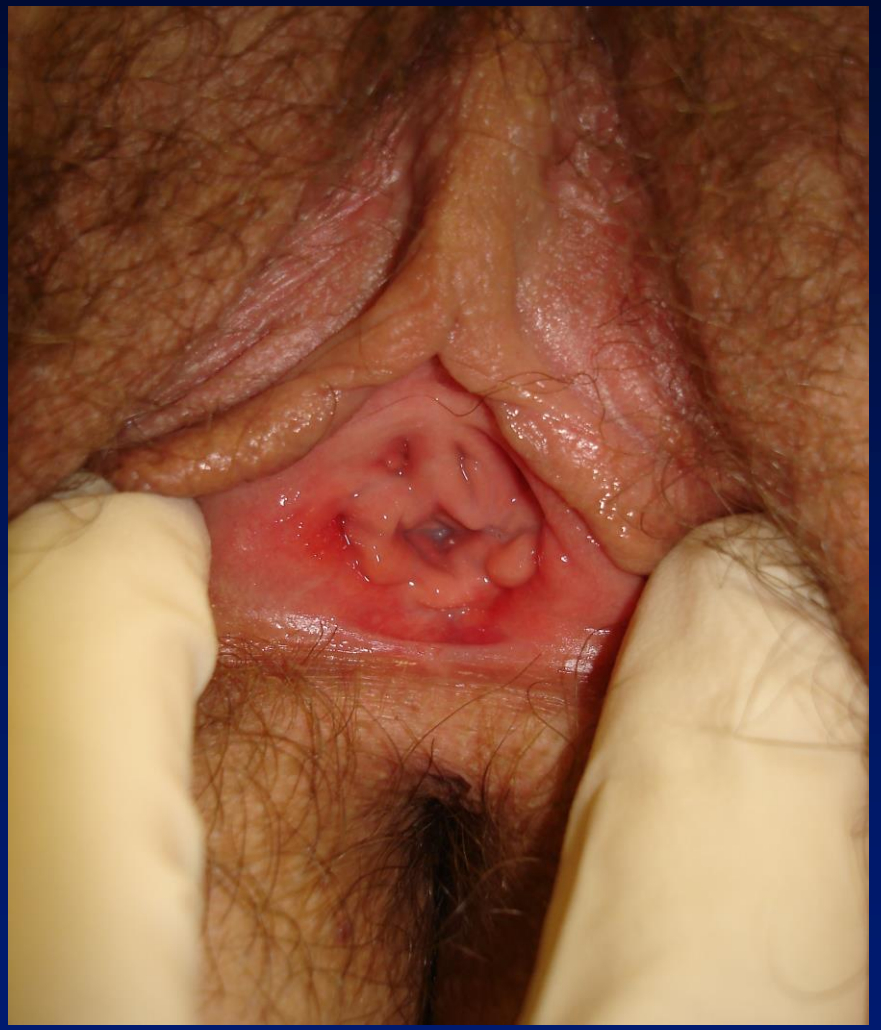
Hormonally Mediated Provoked Vestibulodynia

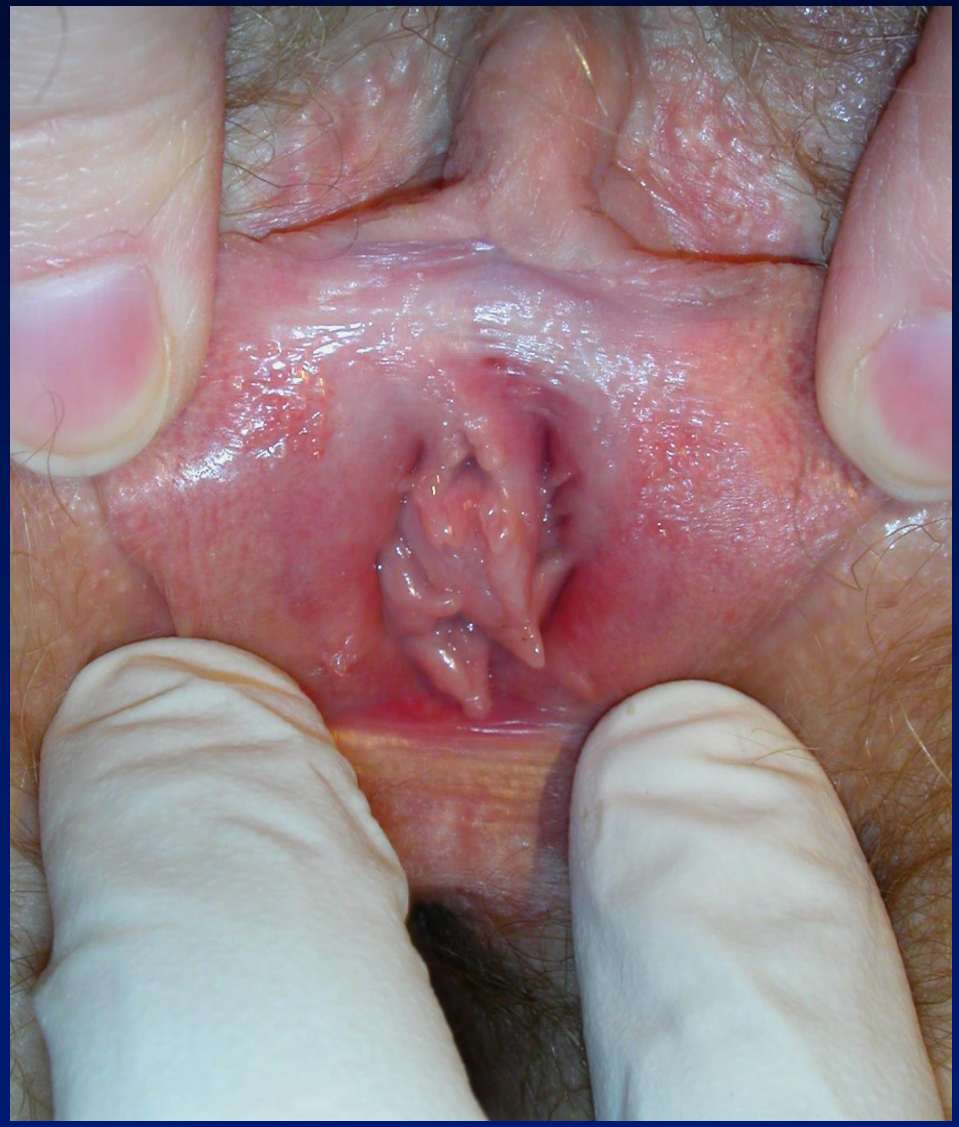
Most commonly caused by hormonal contraceptives (may not resolve just by stopping OCPs.)
Other causes include: menopause, oophorectomy, hormonal control of endometriosis or hirsutism, breast-feeding, infertility treatments, treatment of breast cancer



Burrows LJ, Goldstein AT. Vulvodynia. *J Sex Med 2008;5:5-15.*

Hormonally Mediated Provoked Vestibulodynia

- Diffuse vestibular tenderness of the entire vestibule
- Ostia of glands are frequently erythematous
- The vestibule may have a diffuse pallor with superimposed erythema
- Low estradiol, low free testosterone, very high SHBG



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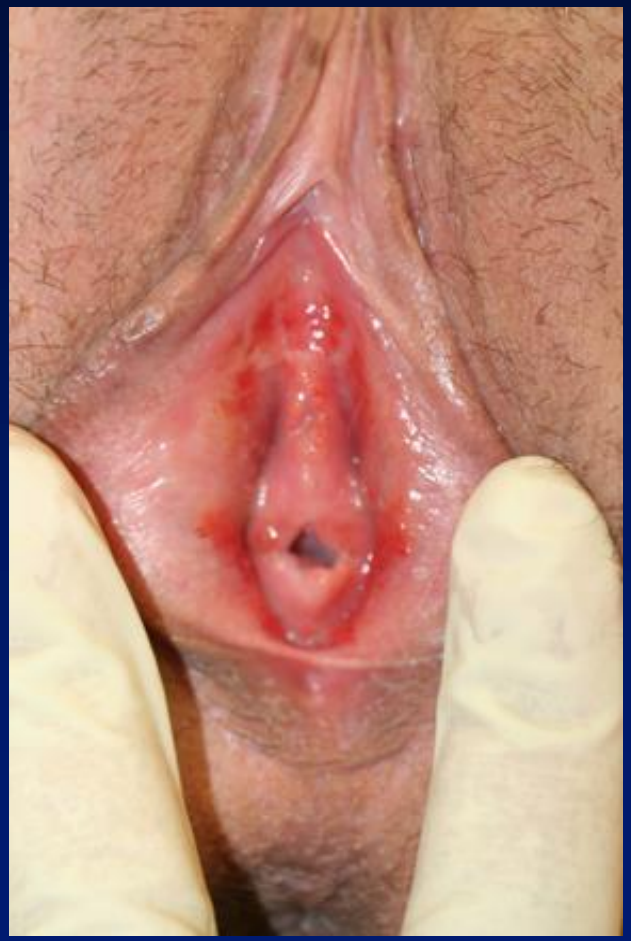
Hormonally Mediated Provoked Vestibulodynia

Treatment:

- **Stop hormonal contraceptives**
- **Systemic testosterone – ideal calculated free testosterone 0.8 ng/dl**
- **Local to vestibule estradiol 0.02%/testosterone 0.1% in methylcellulose BID**
- **Expect no improvement for 6 weeks, 30-40% by 12 weeks**



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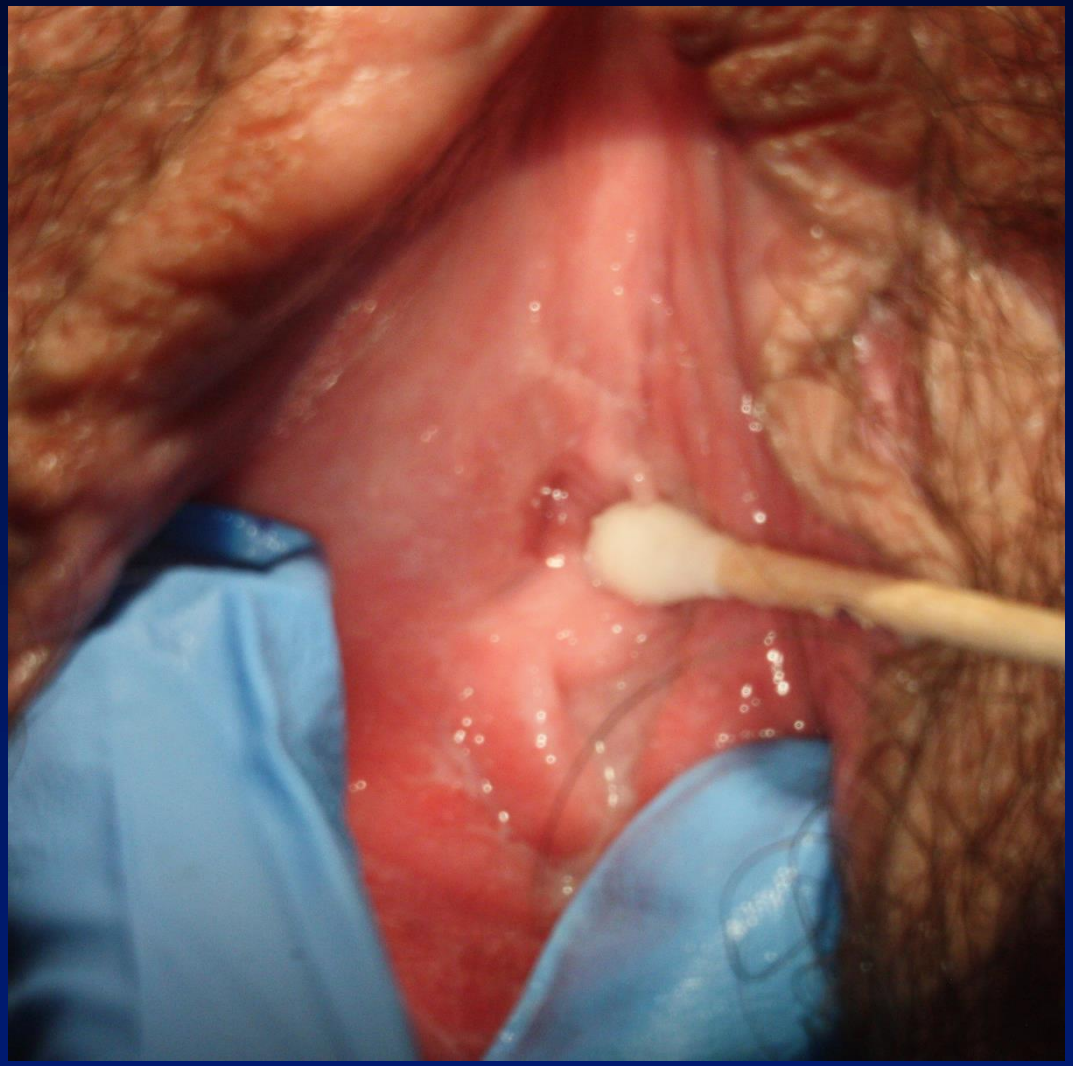

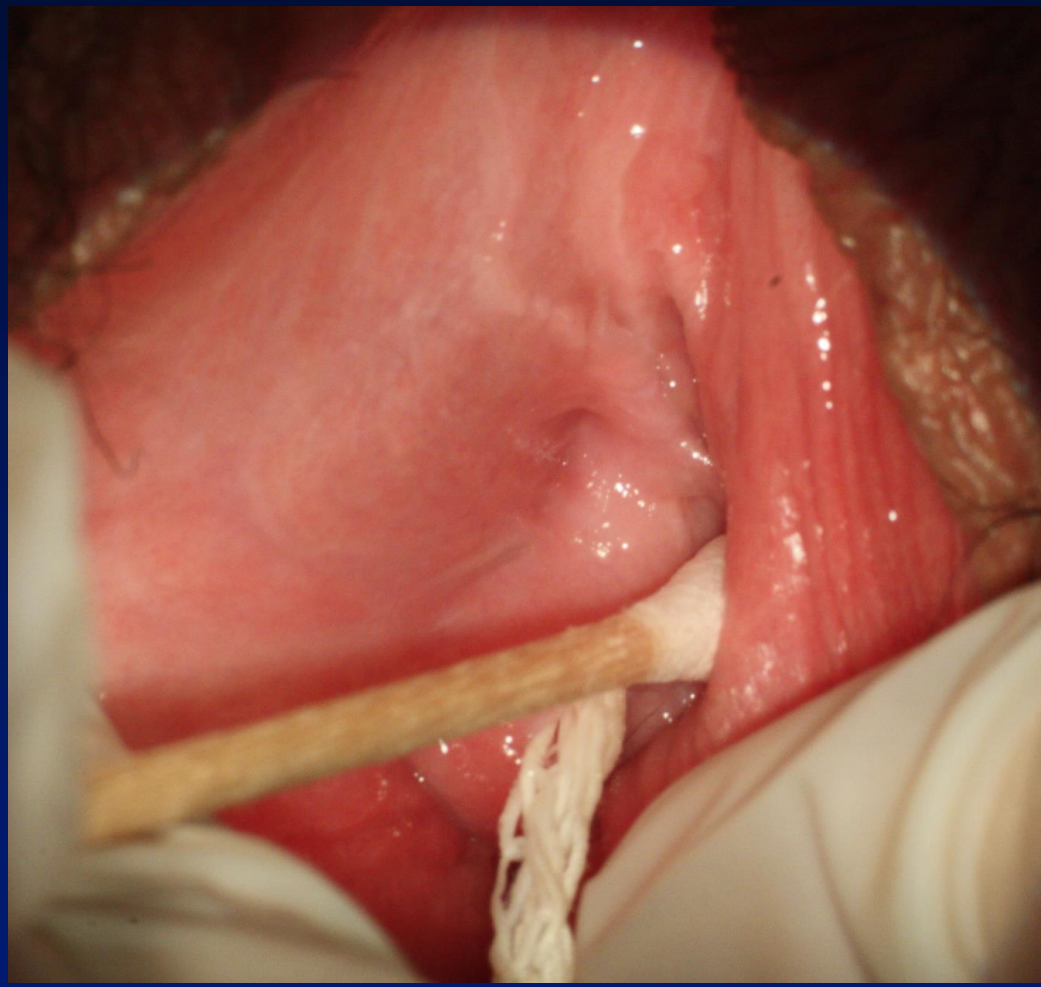

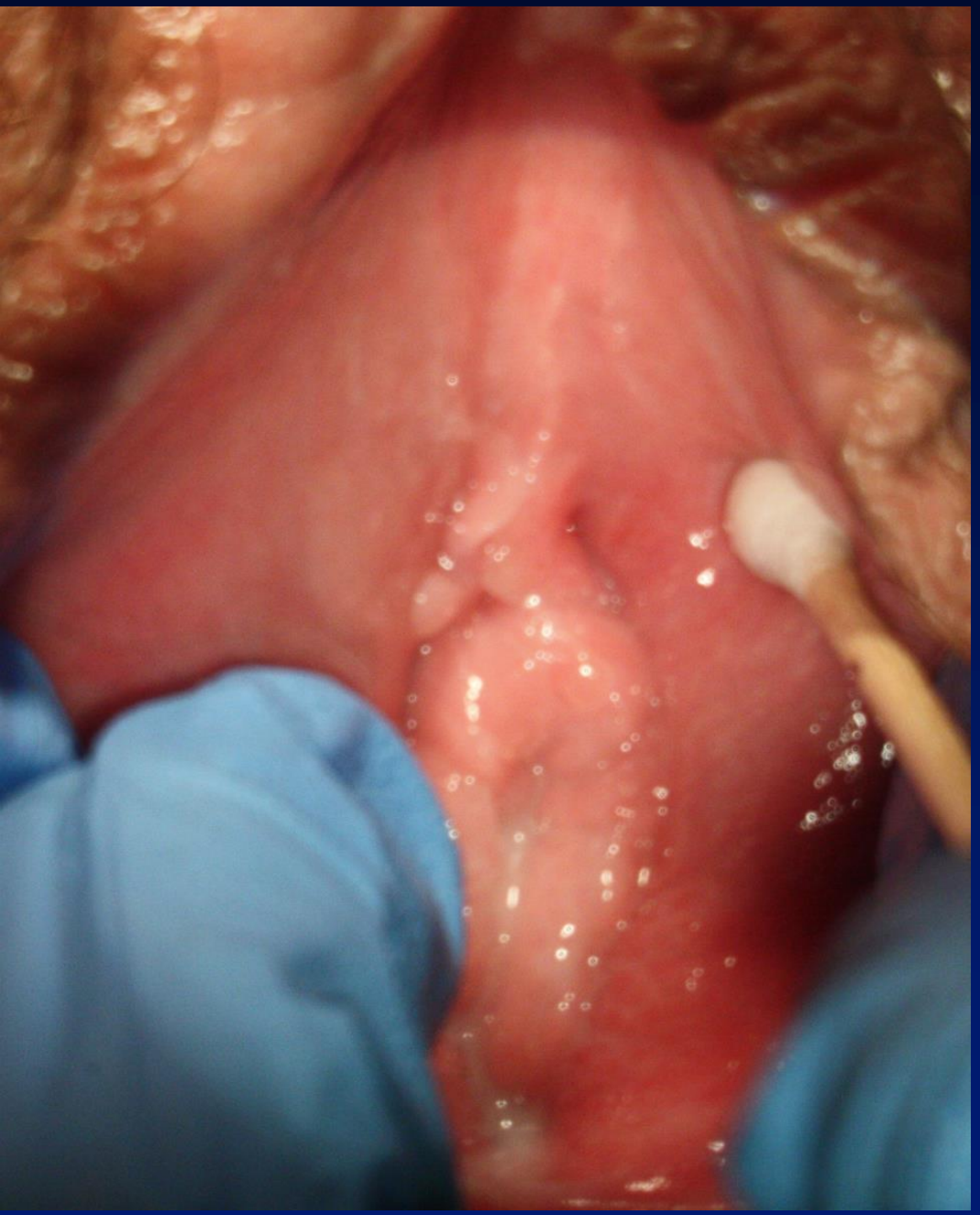

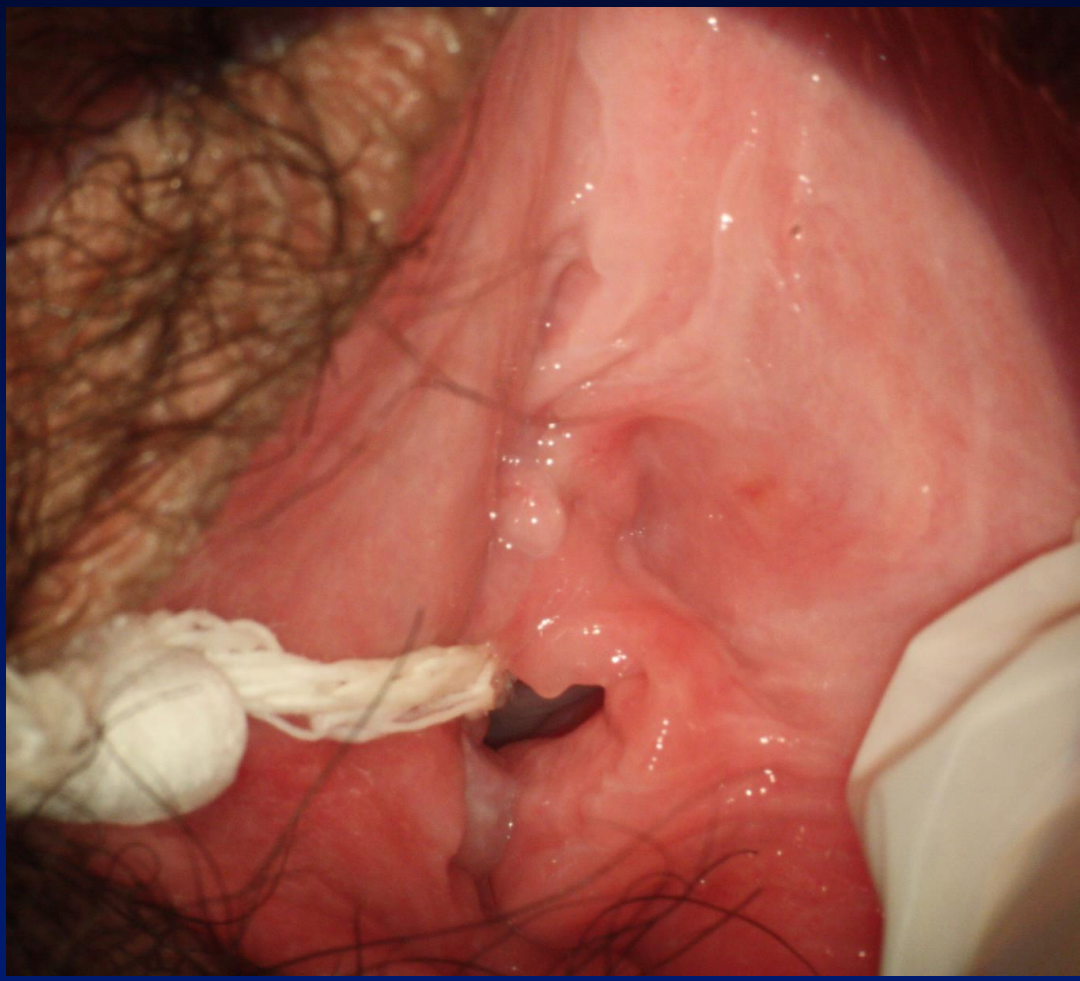

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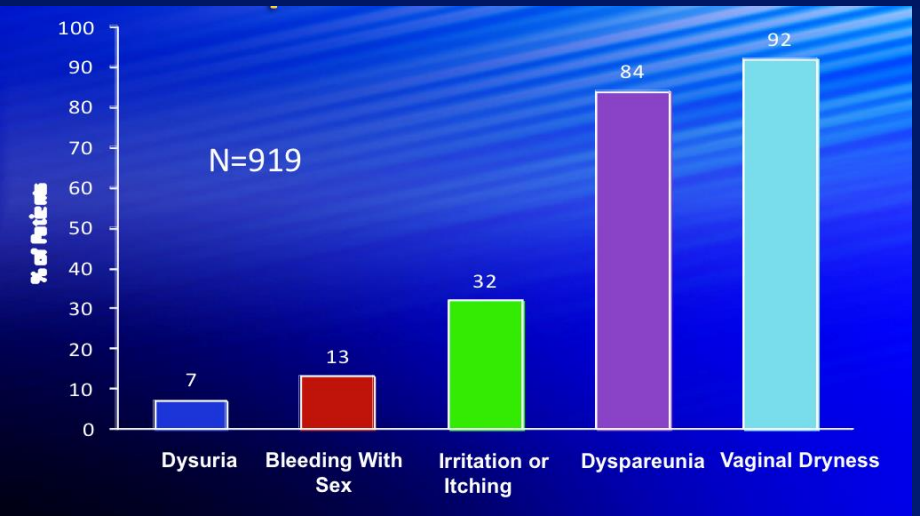
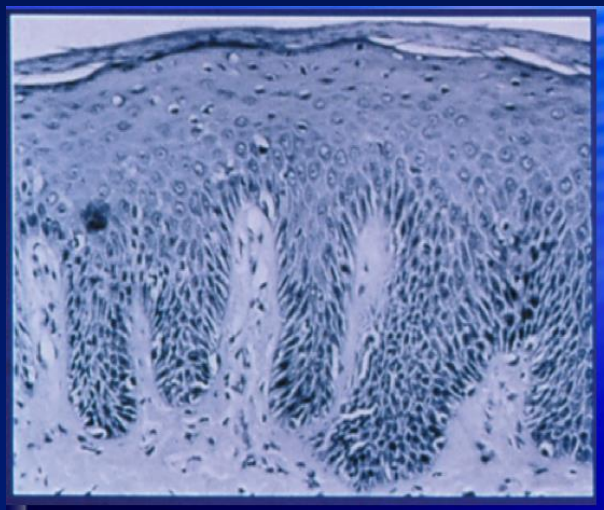
Dryness and insufficient moistness
Diminished blood flow
Dyspareunia
Itching
Burning sensation
Soreness
Loss of elasticity
Thinning of the vaginal tissue and alteration of keratinization

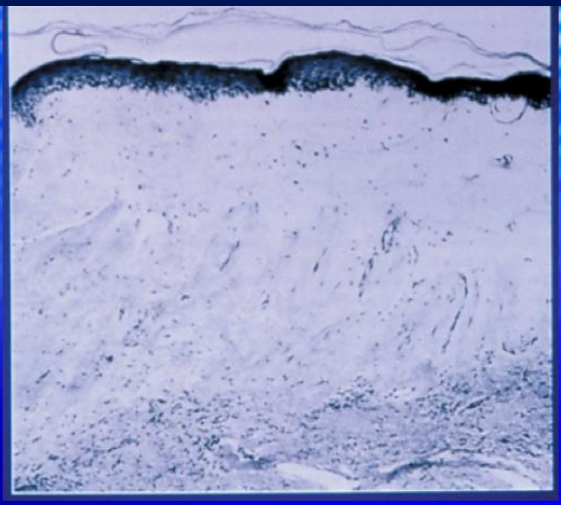


Mucosal defects including petechiae, microfissures, ulceration and inflammation
Shortening, fibrosis, obliteration of vaginal vault and/or
Narrowing of vaginal entrance
Smoothing of fornix, flattening of vaginal rugae



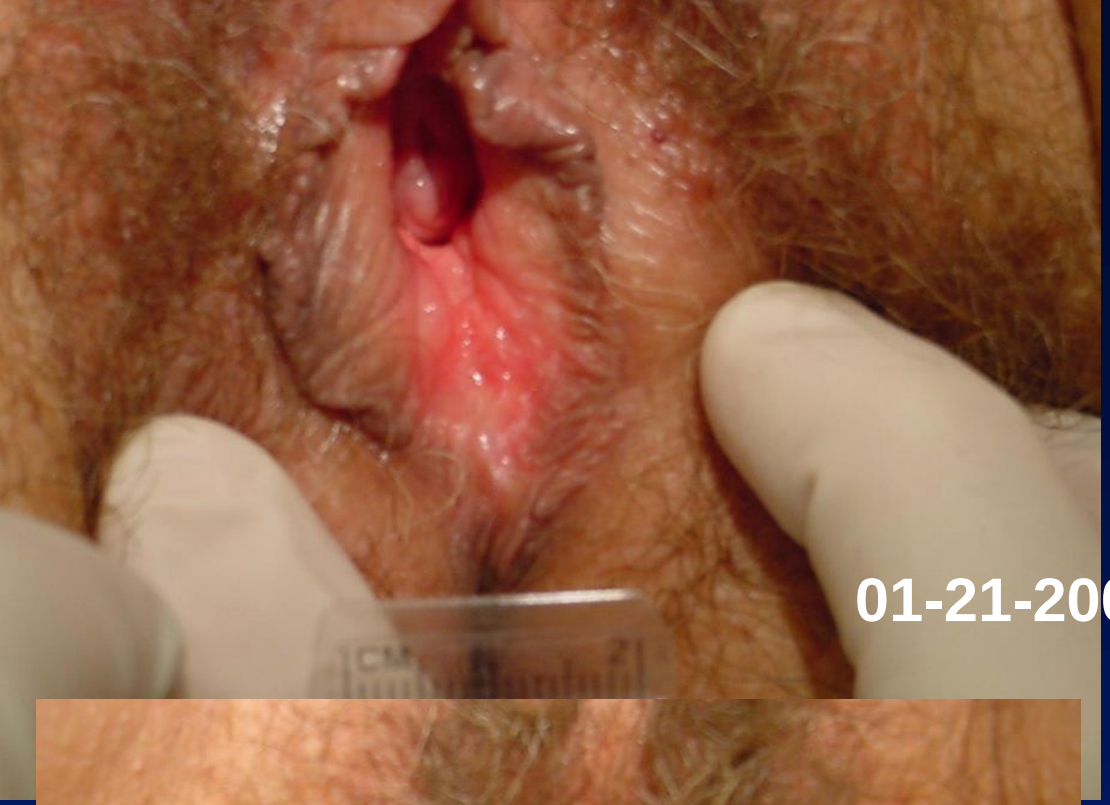
Premenopause

Epithelium well-estrogenized, multi-layered with good blood supply, superficial cells rich in glycogen



Postmenopause

Estrogen-deficiency atrophy with marked thinning of epithelium, blood supply reduced and loss of glycogen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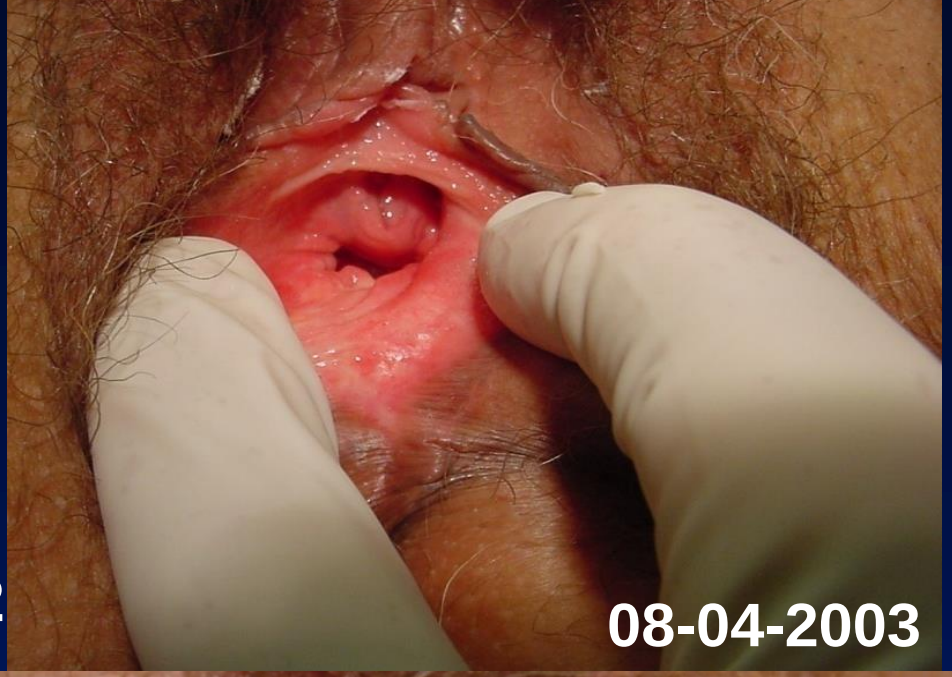
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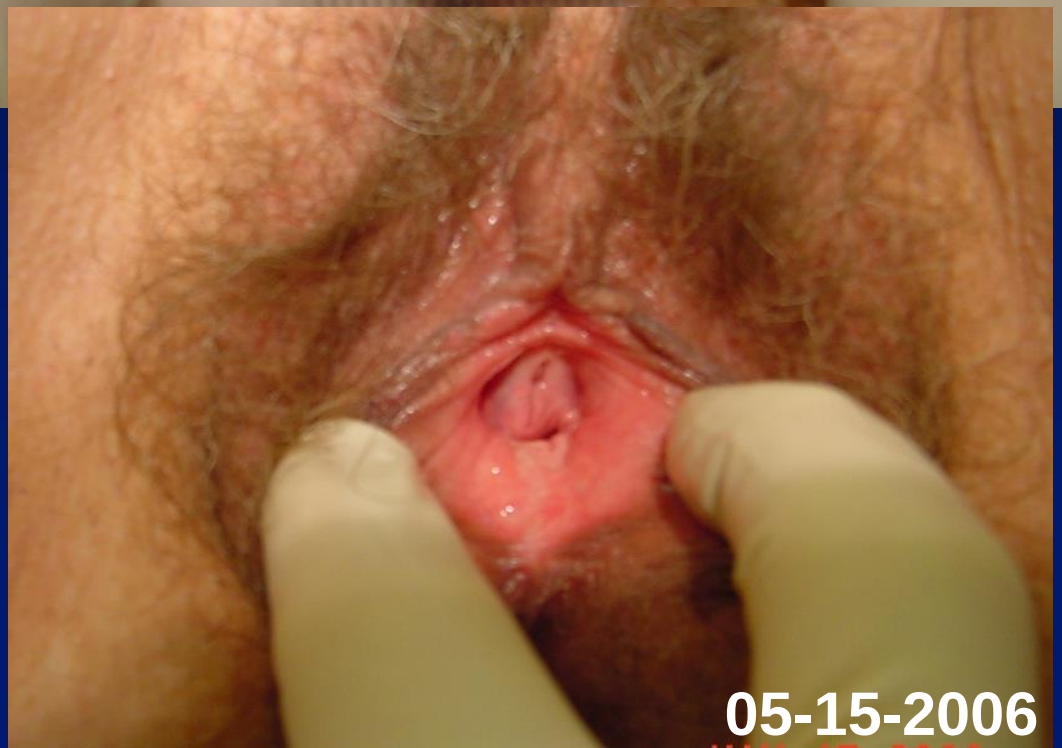
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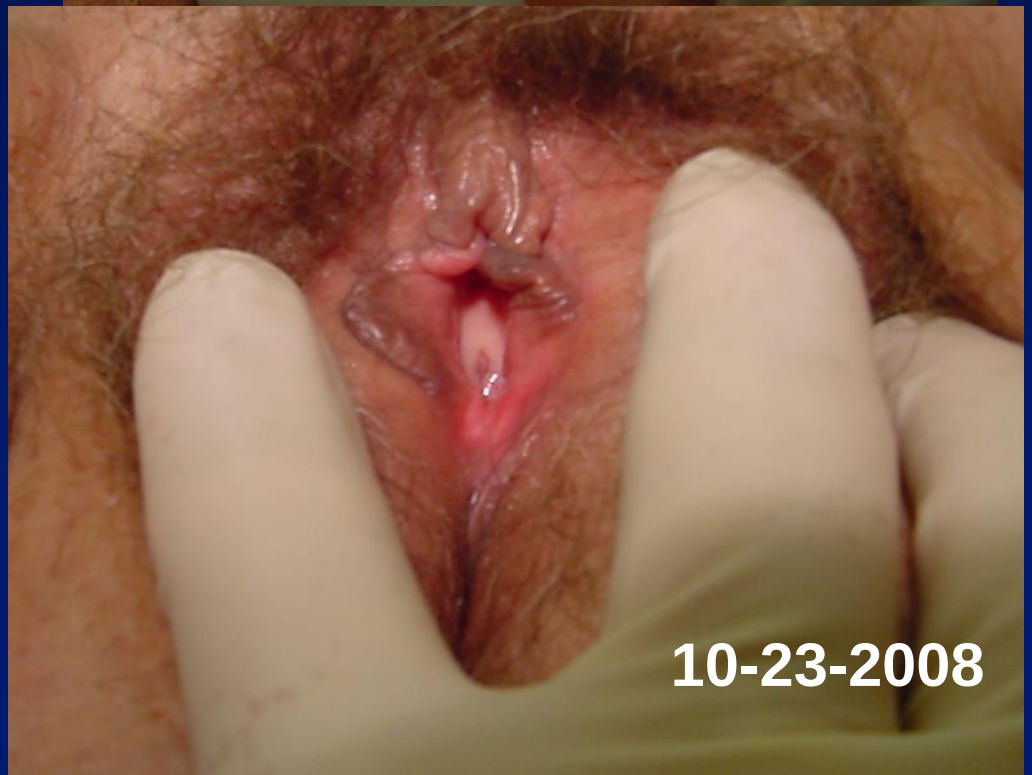
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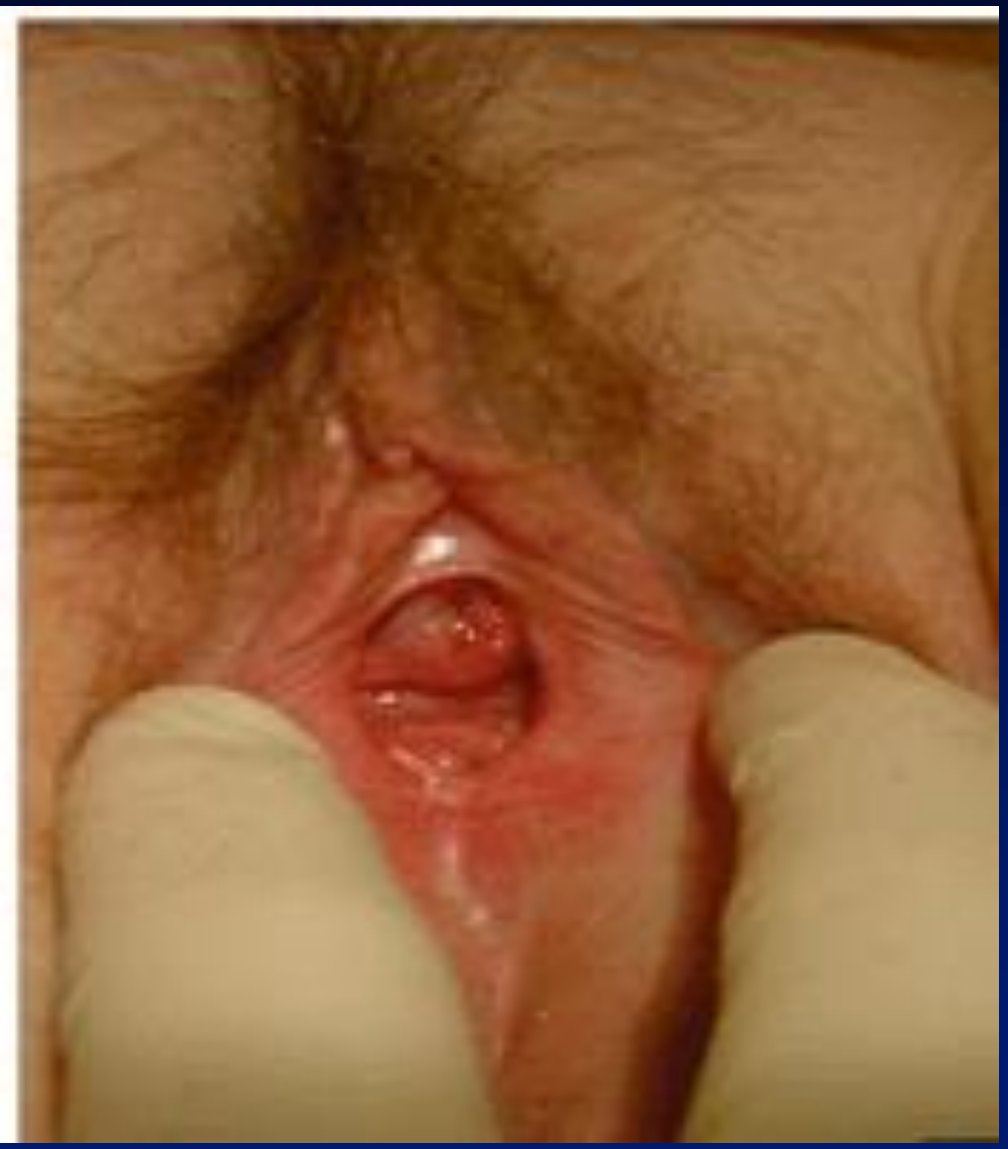
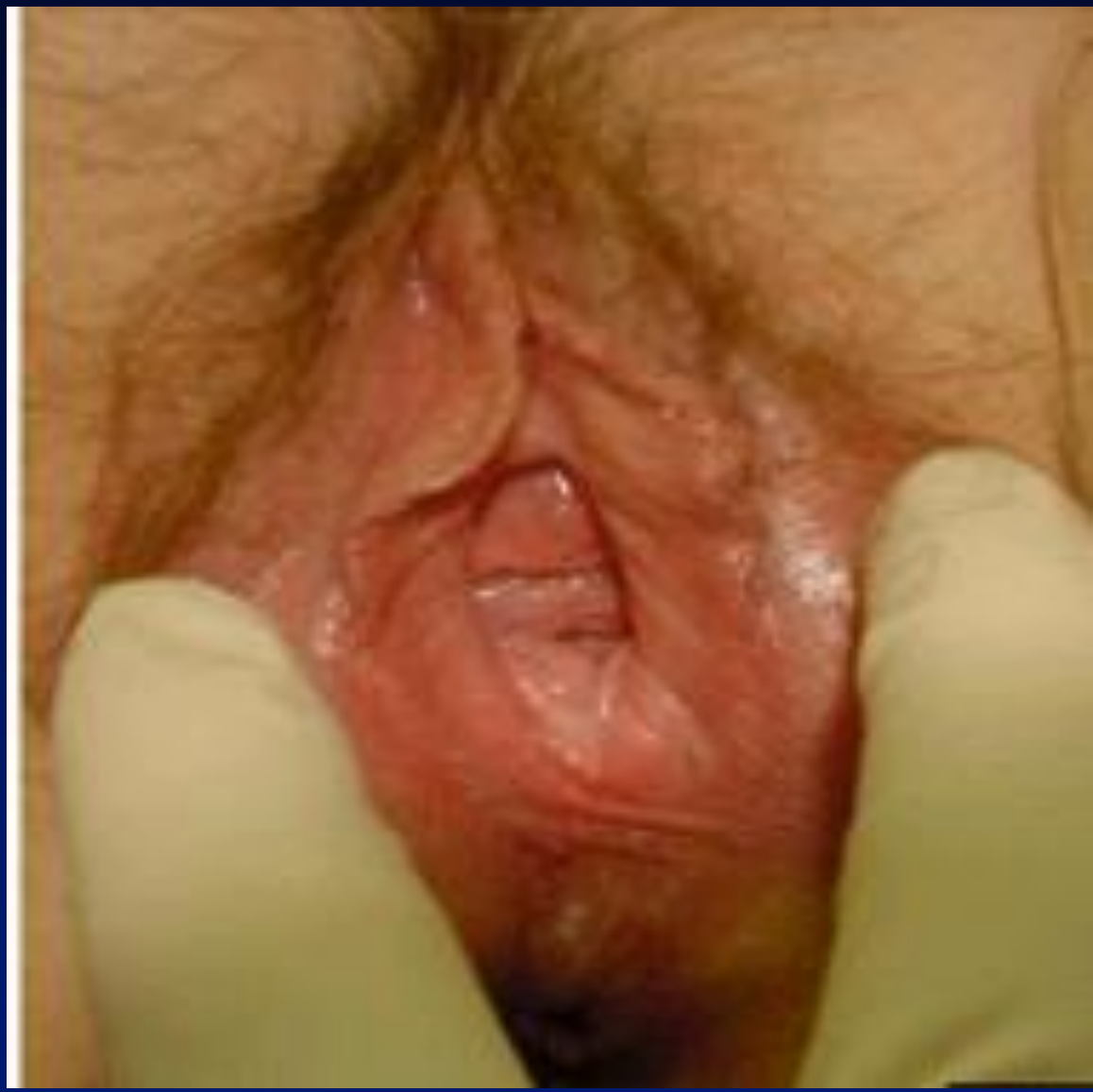
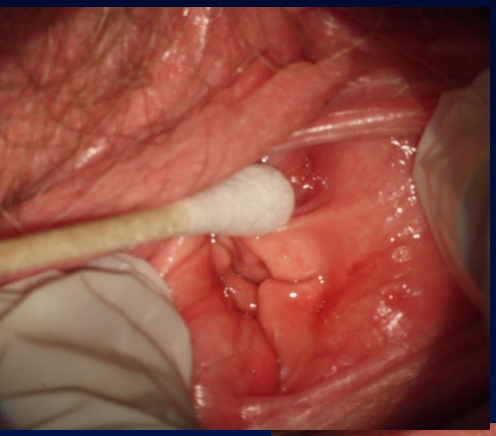
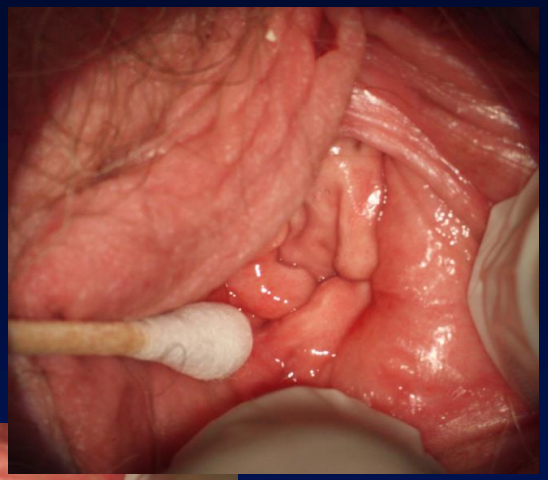
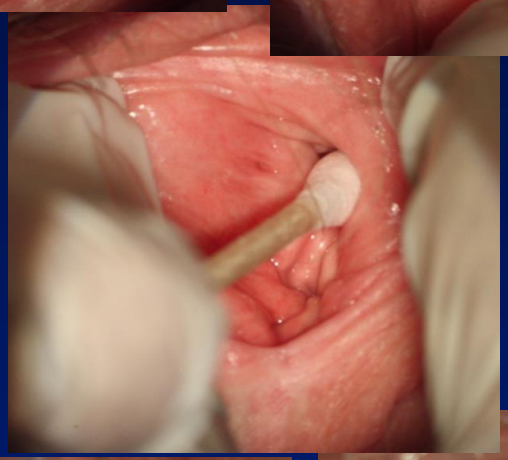
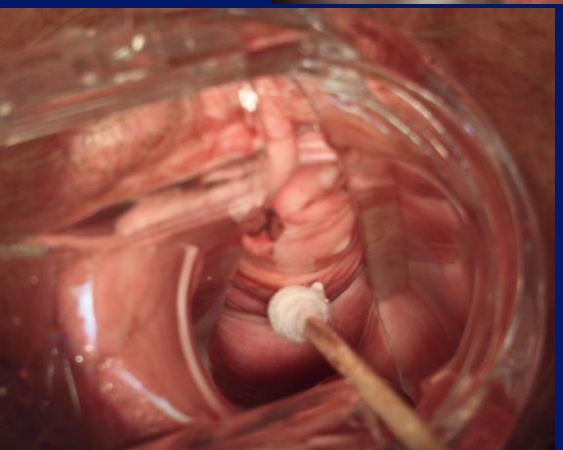
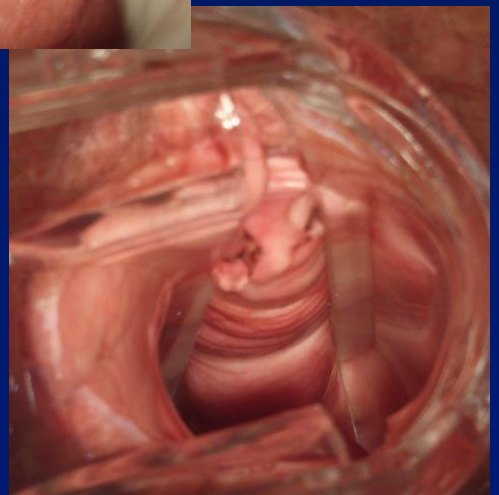
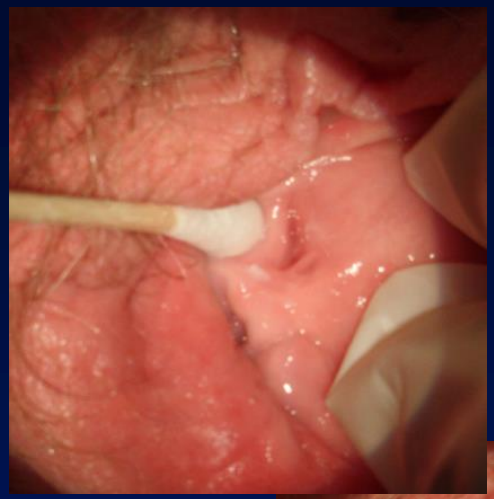
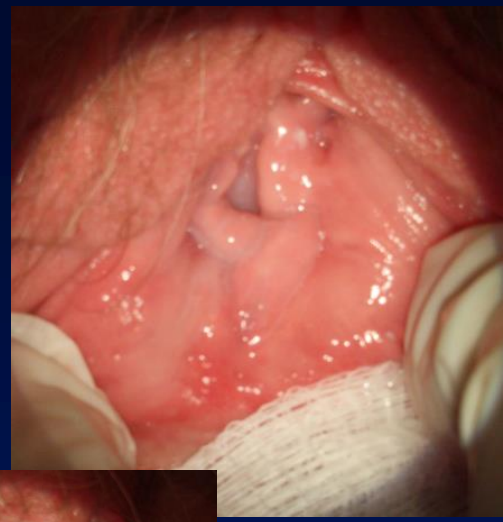
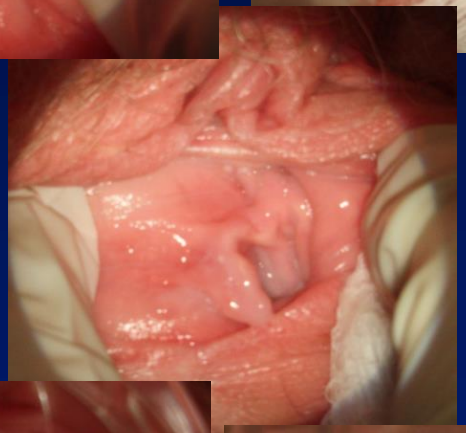
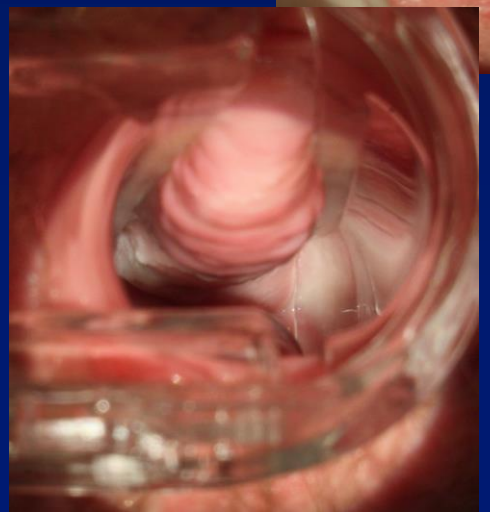
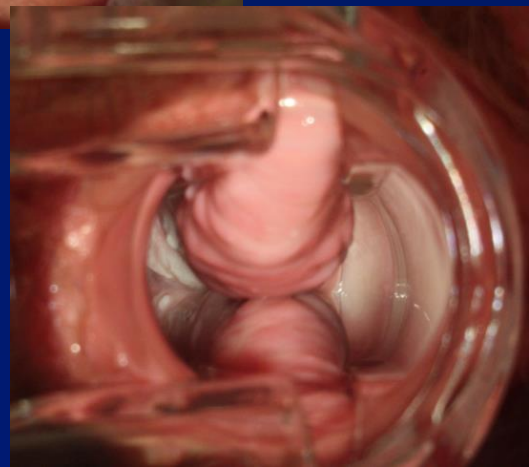




Vulvoscopy 10/5/12

Vulvoscopy 1/18/13

MENOPAUSE MANAGEMENT – FIVE TREATMENTS

Testosterone Therapy

Use FDA-approved testosterone at 10% of male dose

1. Daily transdermal gel - 1/10th tube daily to calf/thigh
   Daily transdermal solution (0.3 ml daily underarm
2. Weekly IM injections - 0.1 ml - 50 mg/ml testosterone enanthate/cypionate - into vastus lateralis muscle – anterolateral mid-thigh; 27 gauge needle; 1 ml syringe
3. 4-6 month subcutaneous testosterone pellet

Estradiol Therapy

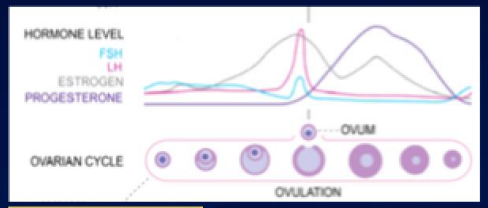
Consider FDA-approved biologically identical estradiol

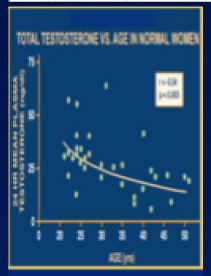
1. Daily oral (↑ SHBG, ↑ VTE, ↑ lipids)
2. Daily transdermal gel, emulsion, spray
3. Twice weekly, weekly transdermal patch
4. Three month vaginal ring
5. Weekly IM injections - 0.1 ml – estradiol valerate 10 mg/ml; 5 ml bottle; vastus lateralis muscle – anterolateral mid-thigh - 27 gauge needle; 1 ml syringe

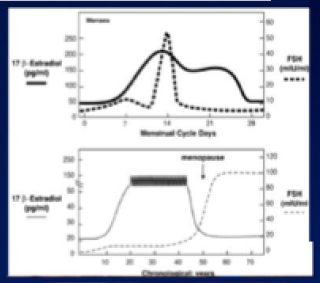
Progesterone Therapy

Consider FDA-approved biologically identical progesterone

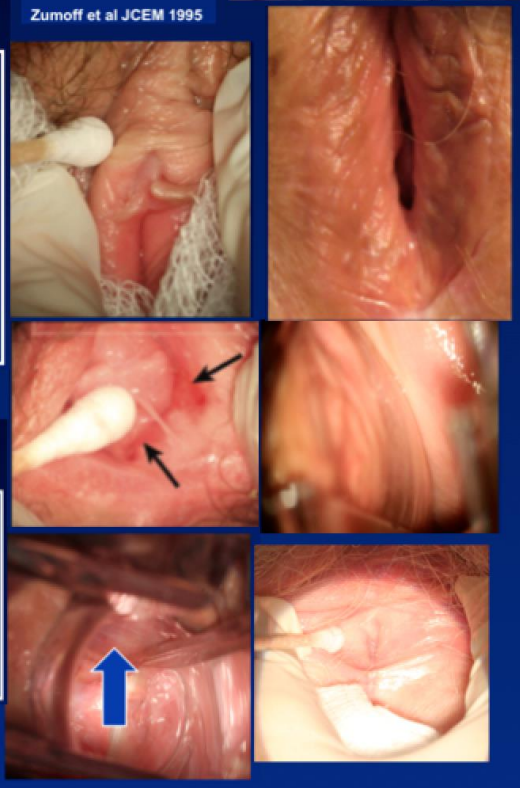
1. Oral micronized progesterone 100 mg q MWF (intact uterus, q MTh hysterectomy)
2. Vaginal progesterone suppository – 6 per month
3. Compound progesterone cream







Zumoff et al JCEM 1995



Vestibular Hormonal Therapy

Compound estradiol 0.02%/testosterone 0.1% in hypoallergenic base (methylcellulose); apply pea-sized volume x 2 (right and lft sides; directly onto entire vestibule; QD – BID

Intravaginal Hormonal Therapy

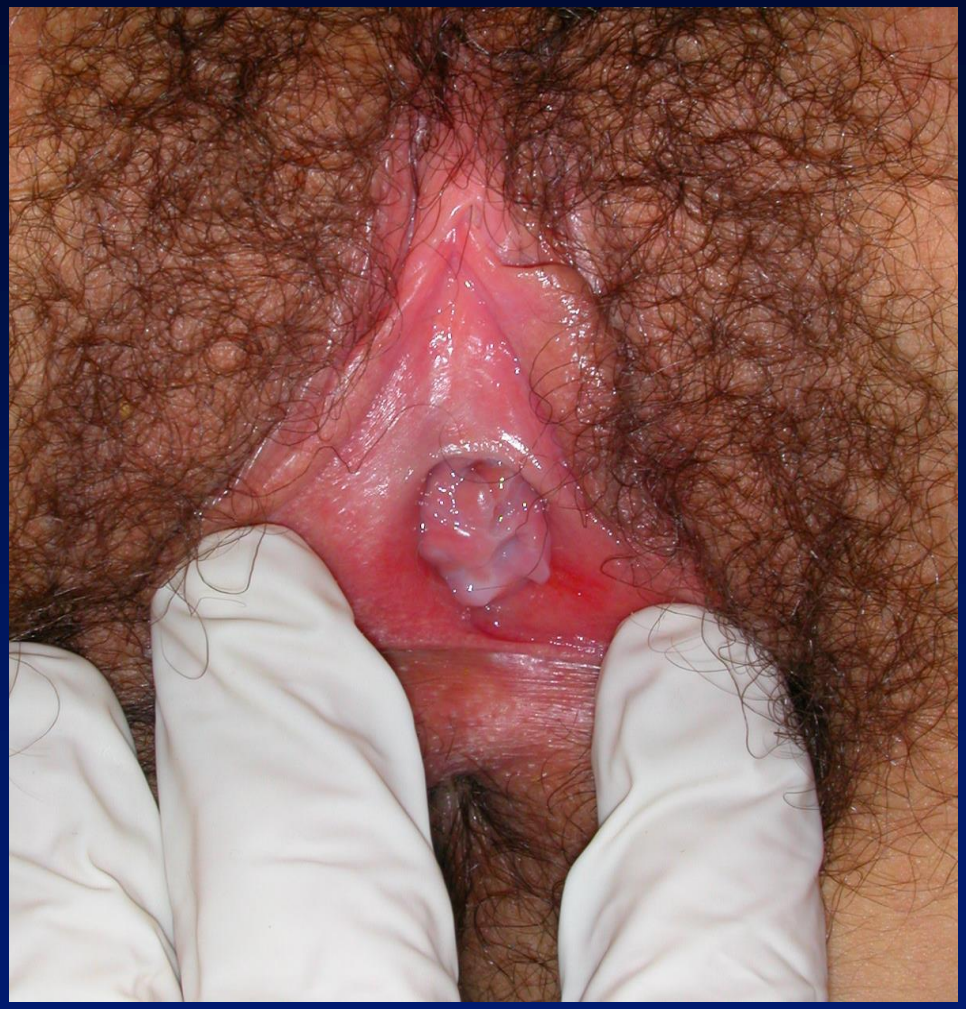
1. Daily compound estradiol 0.02%/testosterone 0.1% in hypoallergenic base (methylcellulose); apply pea-sized volume directly into vagina
2. Daily vaginal estradiol cream – pea-sized amount
3. Daily 10 mg DHEA tablet/1% DHEA suppository
4. Three month vaginal ring

Persistent Genital Arousal Disorder (PGAD):

a) altered pre-menopausal hormone integrity – hormonally mediated provoked vestibulodynia
b) altered menopausal hormone integrity – vulvovaginal atrophy/genitourinary syndrome of menopause
c) increased nerve fiber density - genetic susceptibility leading to elevated levels of nerve growth factor substances
d) an injury to, or irritation of, the pudendal nerves that transmit pain and other sensations
e) abnormal response of tissues to Candida infection, or recognized allergies or non-specific allergies
f) dermatologic conditions: lichen sclerosus or lichen planus
g) vulvar granuloma fissuratum
h) peri-urethral glans pathology
i) clitorodynia
j) pelvic congestion syndrome
k) arterio-venous malformation
l) S2 Tarlov cyst
m) high tone pelvic floor dysfunction

Acquired Neuro-Proliferative Vestibulodynia

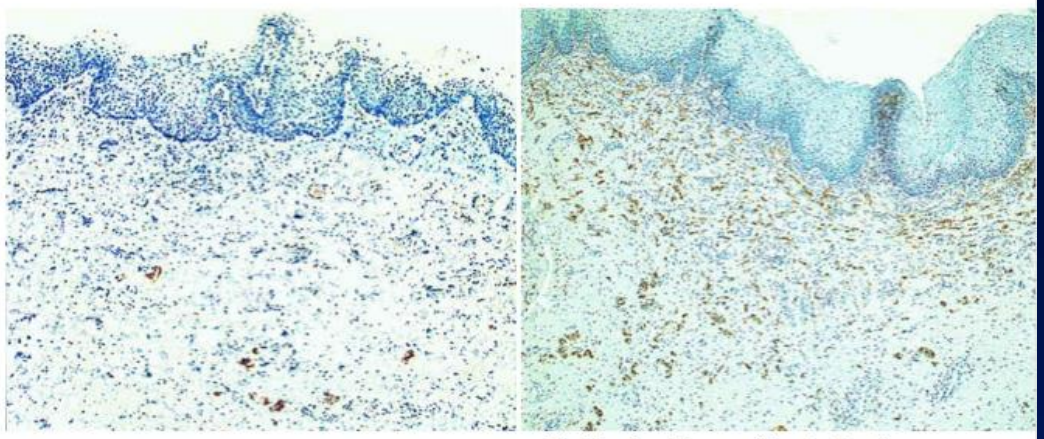
- Women reports onset of symptoms after severe or recurrent candidiasis or allergic reaction[1,2]
- Polymorphism in genes coding for IL-1ra, IL-1β[2,3]
- Decreased INF-α[3]
- Elevated TNF, IL-1β, IL-6, IL-8, Heparanse[3]
- Increased mast cells in mucosa[4]
- Persistent inflammation can lead to a proliferation of C-afferent nociceptor[4]



1. Harlow BL Ann Epidemiol. 2009 Nov;19(11):771-77
2. Witkin SS Am J Obstet Gynecol. 2002 Mar;186(3):361-4.
3. Foster Am J Obstet Gynecol. 2007 Apr;196(4):346.e1-8
4. Bornstein J Int J Gynecol Pathol. 2008 Jan;27(1):136-41.

Neuroproliferative Vestibulodynia

S-100 Immunostain

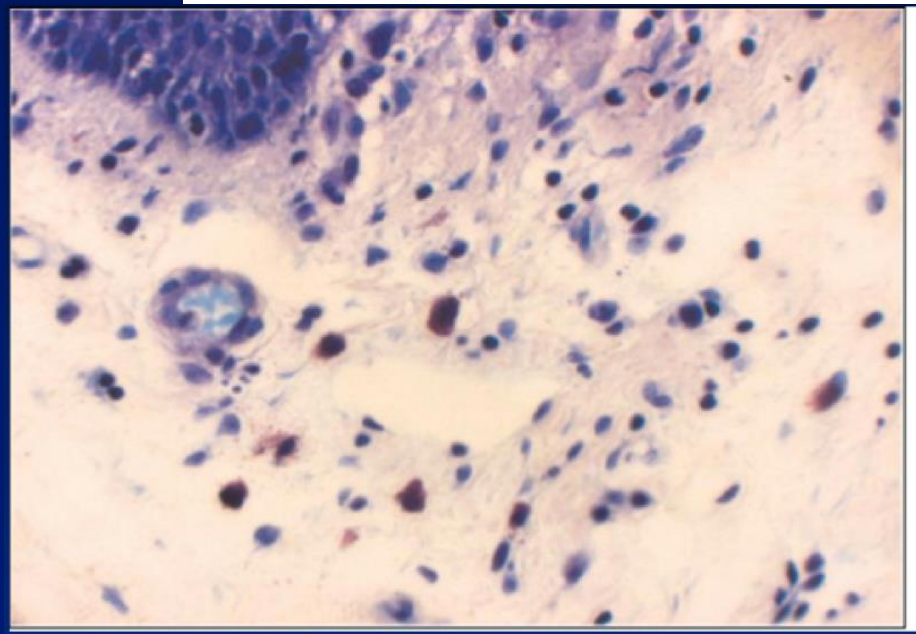


29-year-old control

Only a few nerve cell bundles are detectable (×25)

Patient with vestibulodynia

Abundant proliferation of nerve fibers (×25)



Involvement of Heparanase in the Pathogenesis of Localized Vulvodynia.
Bornstein, Jacob; Cohen, Yitzhak; Zarfati, Doron; Sela, Shifra; Ophir, Ella

International Journal of Gynecological Pathology. 27(1): 136-141, January 2008.
DOI: 10.1097/pgp.0b013e318140021b

FIG. 1 . A x600 Giemsa stain depicting the mast cells subepithelially in a specimen from localized vulvodynia.

Neuroproliferative Vestibulodynia

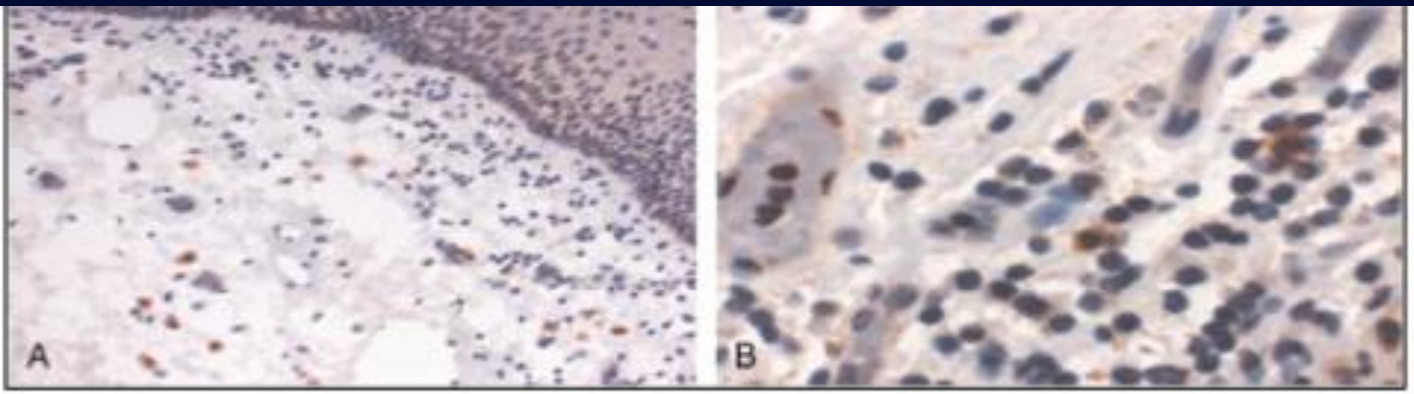


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FIG. 2 . A x400 (A) and x600 (B) CD117 (C-kit) stain depicting mast cells. They are located subepithelially, among other inflammatory cells, in a specimen from localized vulvodynia.

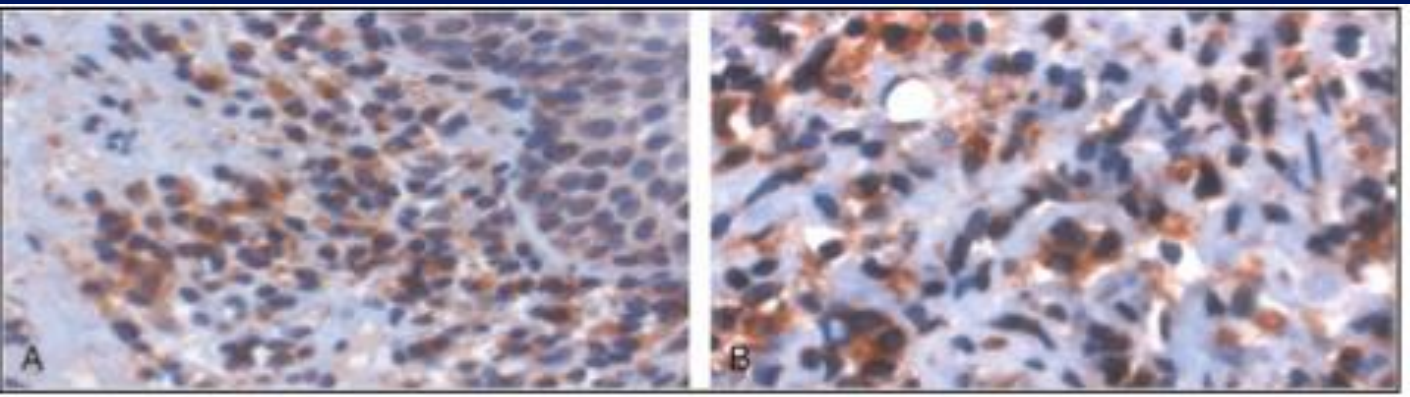

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FIG. 3 . Heparanase expression. x400 (A) and x600 (B). Positive cytoplasmatic staining is seen in the subepithelial layer, close to the epithelial basement membrane.

Neuroproliferative Vestibulodynia

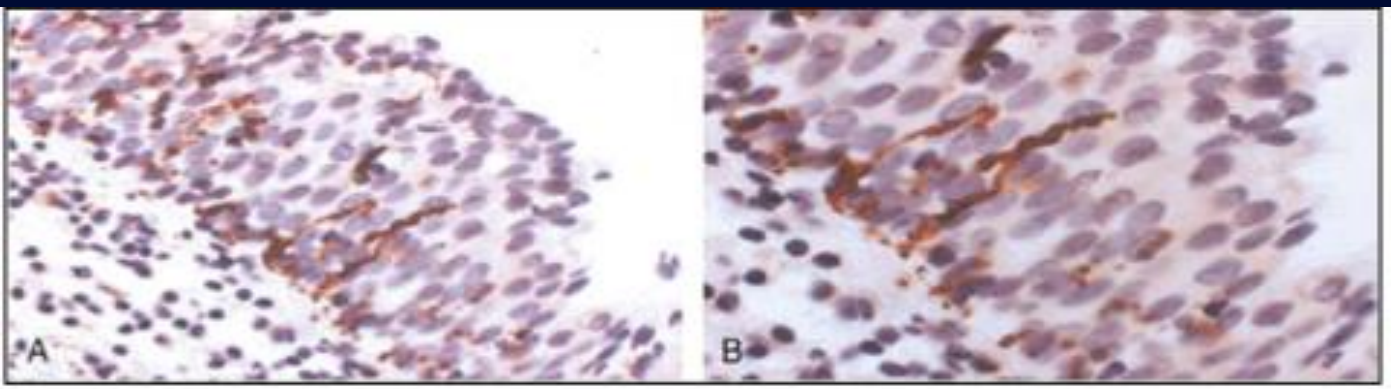

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FIG. 4 . x400 (A) and x600 (B) staining for PGP 9.5. The nerve fibers are seen intruding into the epithelium to more than half its depth.

Characteristic	Score (0–3)						
	Localized Vulvodynia			Control			
	Mean ± SD	Median	Range	Mean ± SD	Median	Range	2-Sided *P**
No. mast cells (Giemsa stain)	2.14 ± 0.378	2.0	2–3	0.14 ± 0.378	0.0	0–1	0.001
Heparanase expression	2.71 ± 0.488	3.0	2–3	0.14 ± 0.378	0.0	0–1	0.001
Subepithelial innervation (PGP 9.5)	2.0 ± 0	2.0	2–2	0.71 ± 0.488	1.0	0–1	0.001
Intraepithelial innervation (PGP 9.5)	2.0 ± 0	2.0	2–2	0.14 ± 0.378	0.0	0–1	0.001

*Wilcoxon rank sum test (Mann-Whitney *U* test).

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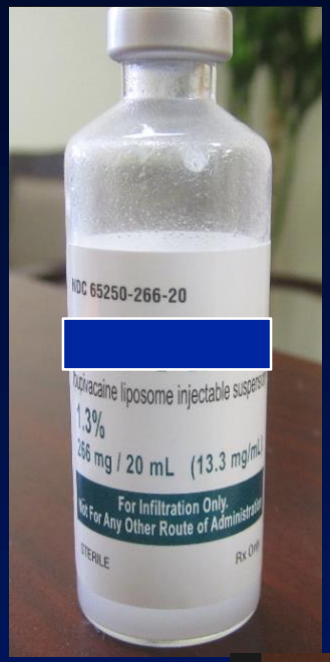
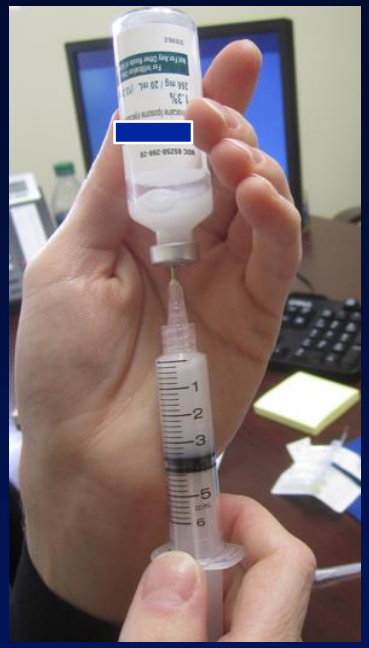
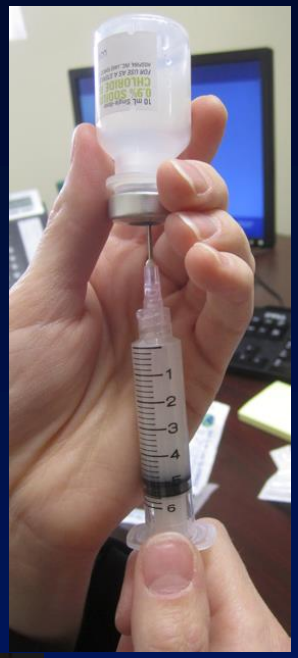
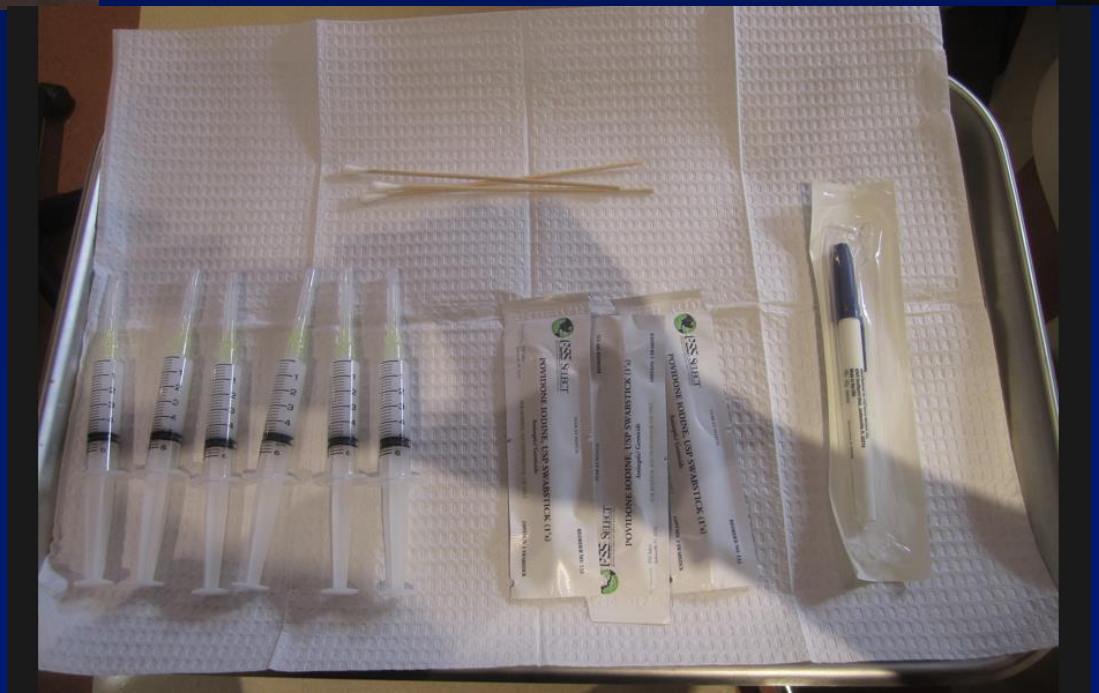
TABLE 1 . Comparison of semiquantitative scores in localized vulvodynia and controls

VESTIBULAR ANESTHESIA TEST









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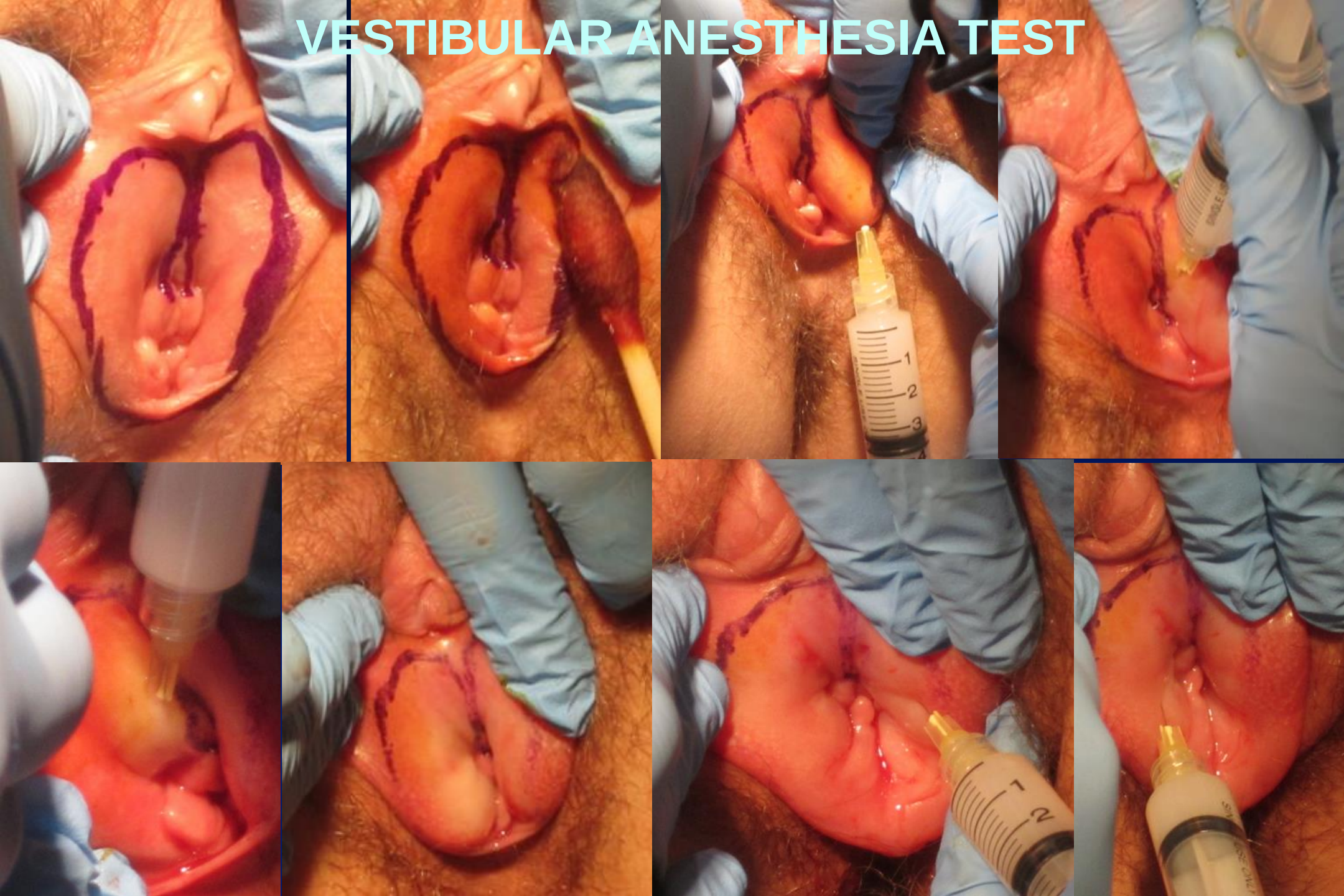
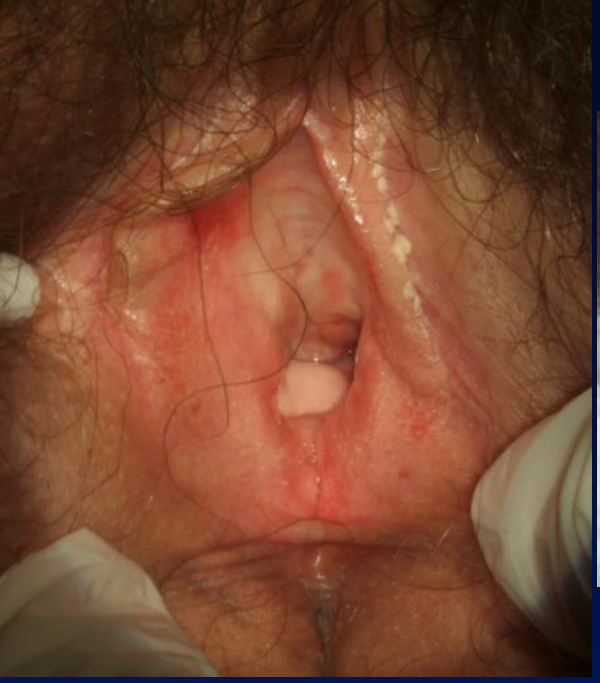
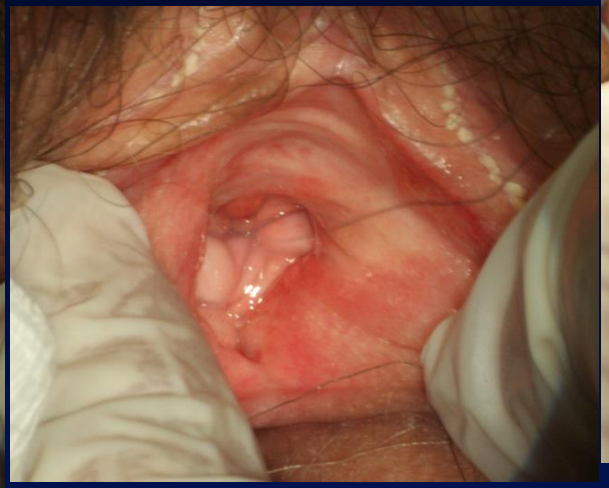
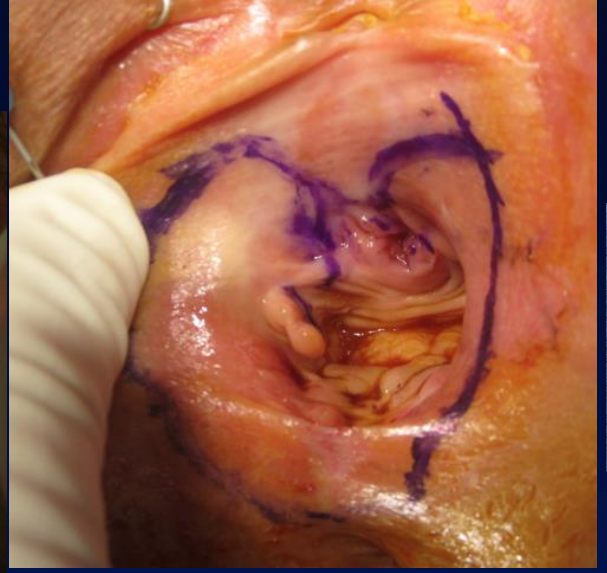
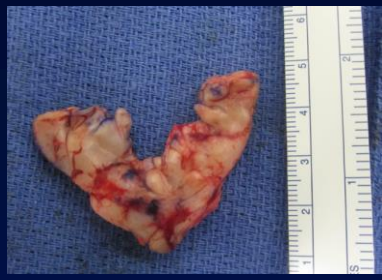


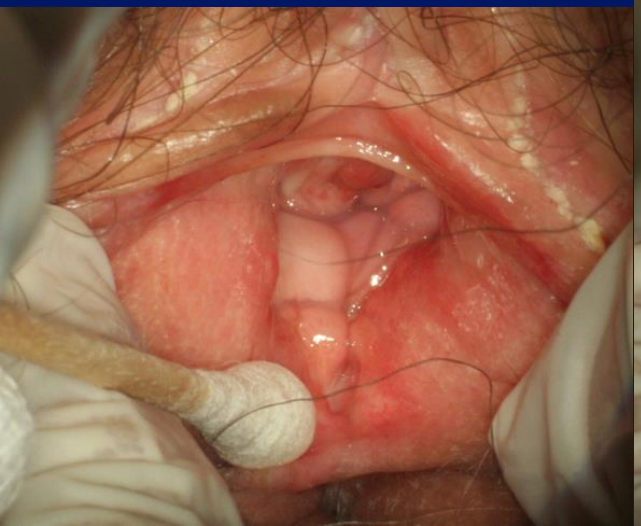


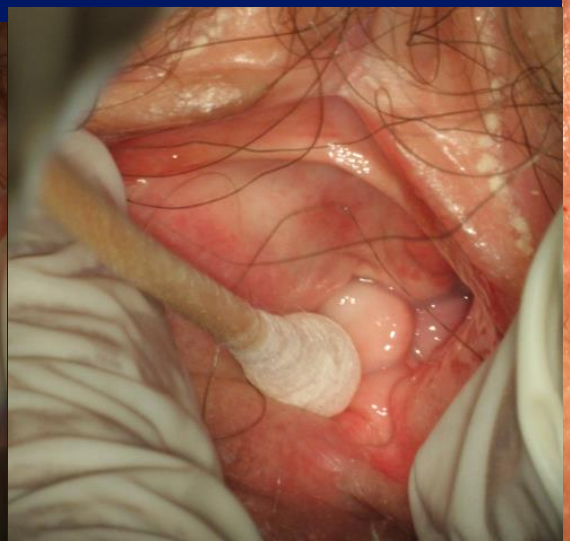


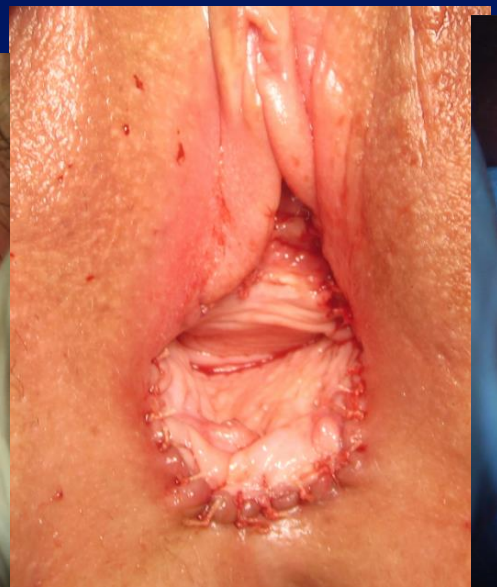


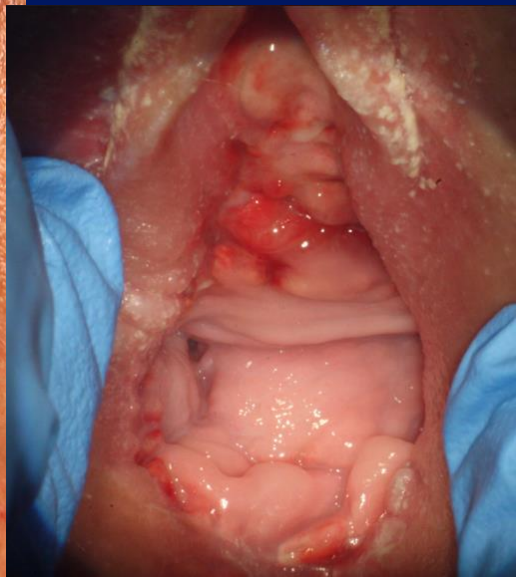


6 weeks post-op









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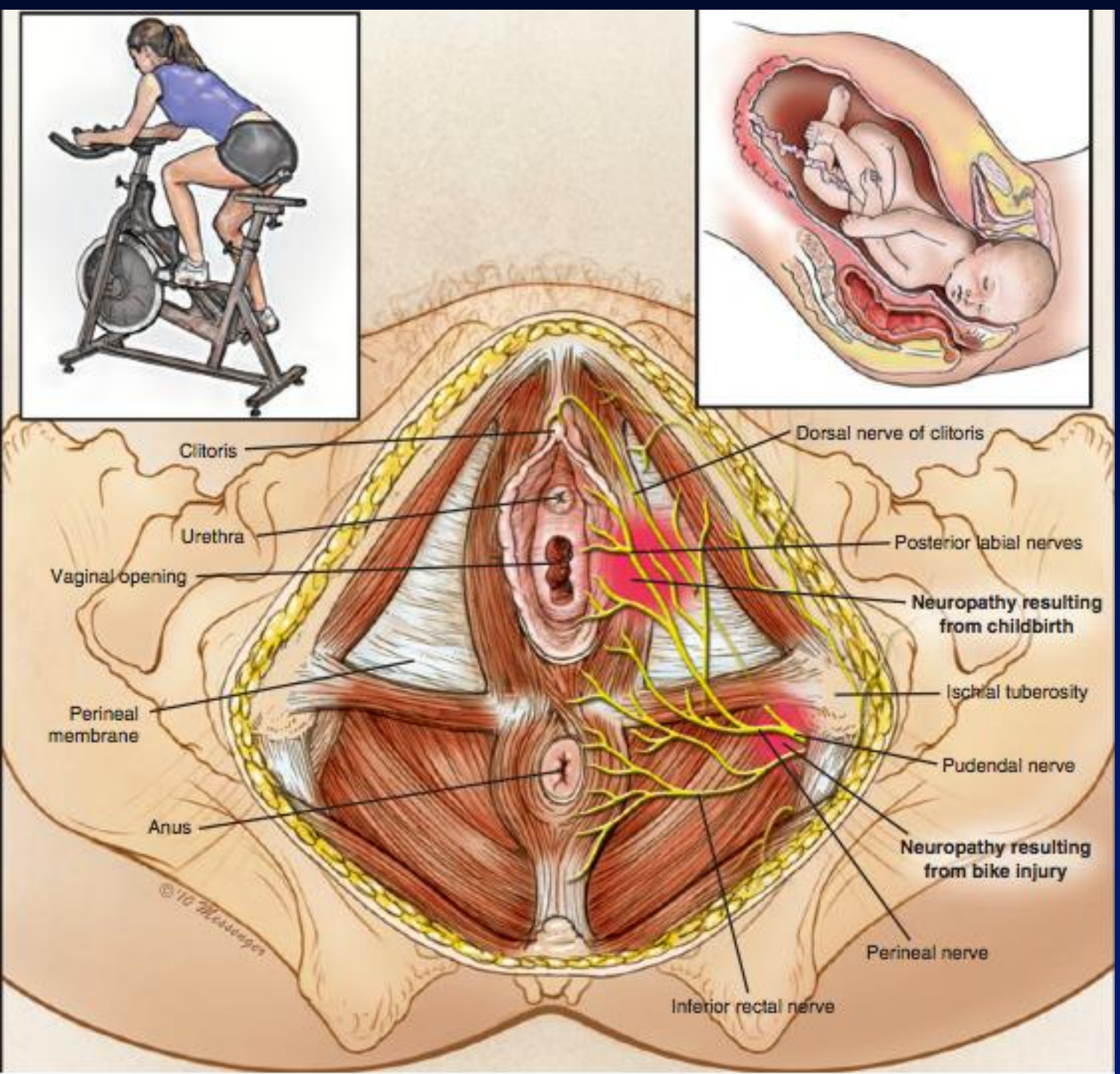


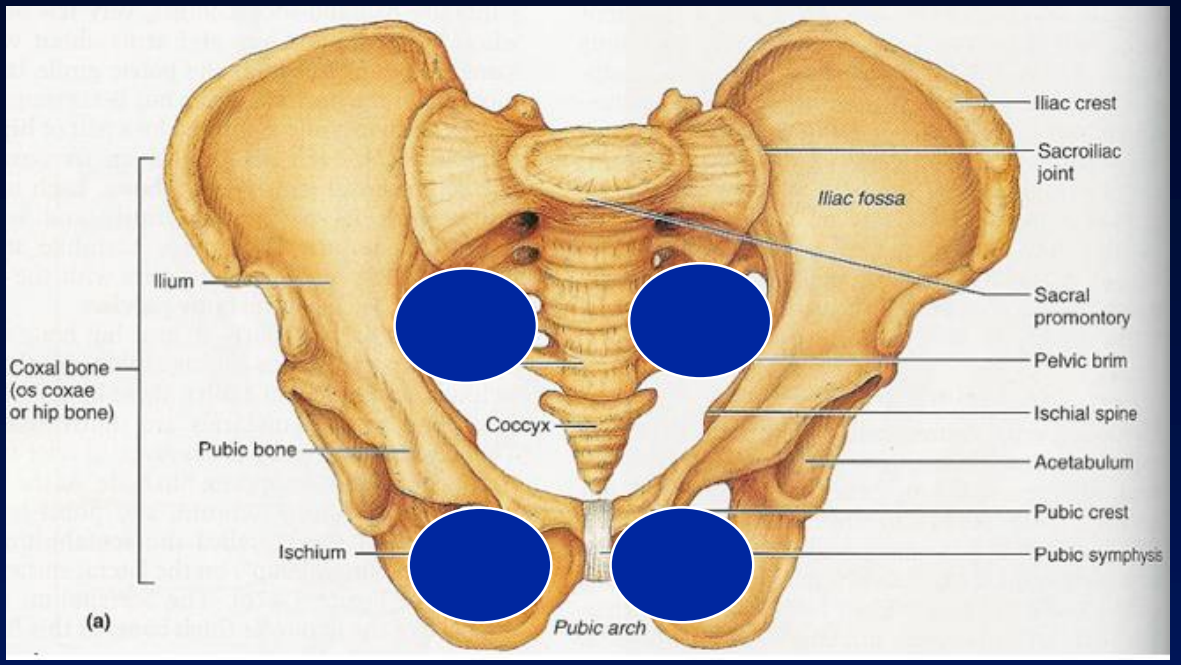
J Sex Med 2010;7:1716–1719

Techniques of Pudendal Nerve Block

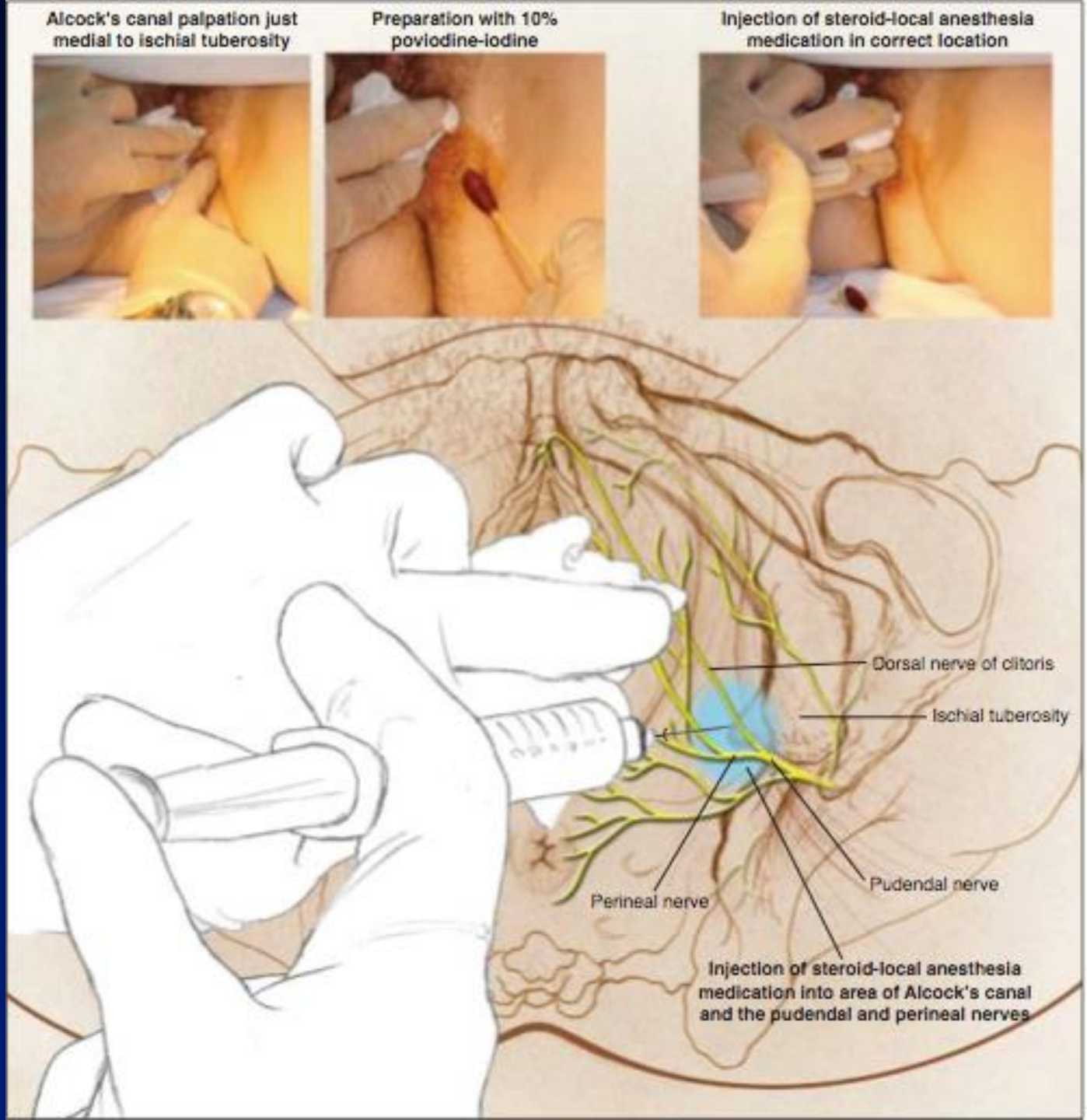
Lauri Romanzi, MD

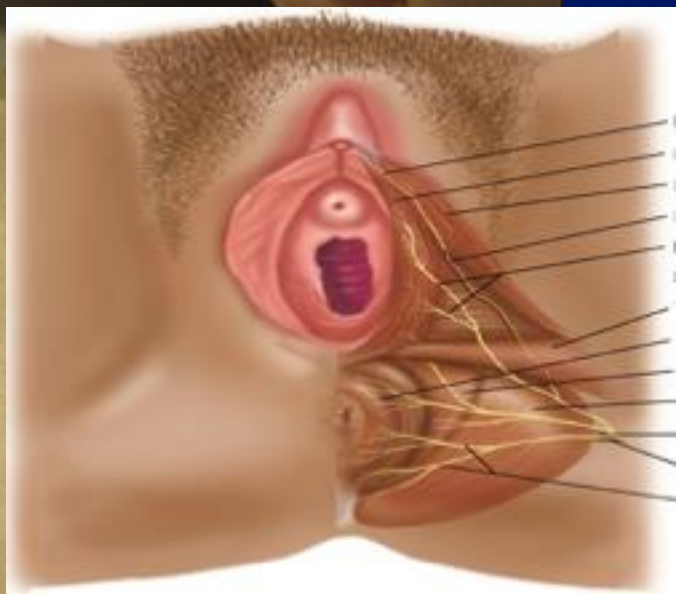
Weill Cornell Medical Center, New York Presbyterian Hospital, New York, NY, USA

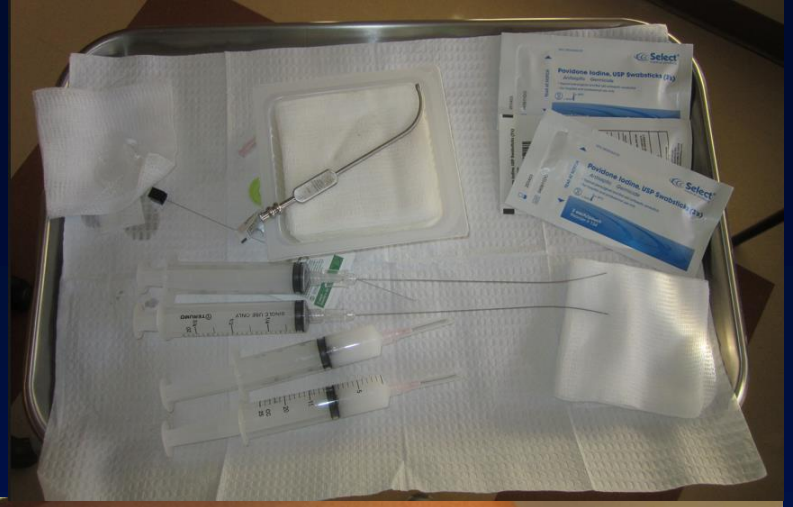
"TENS" - Transcutaneous Electrical Nerve Stimulation.

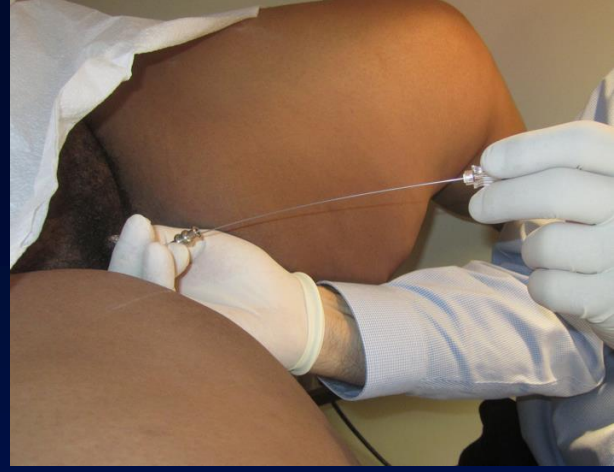


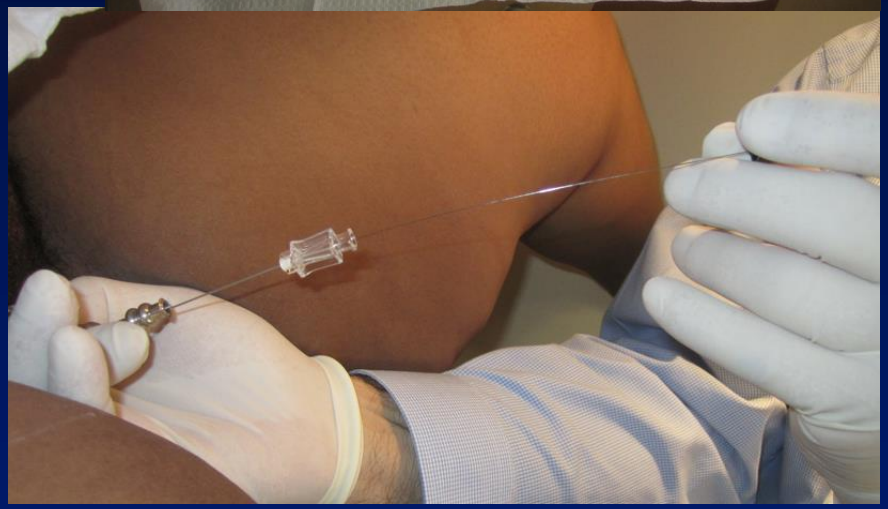
Pudendal Nerve Blocks

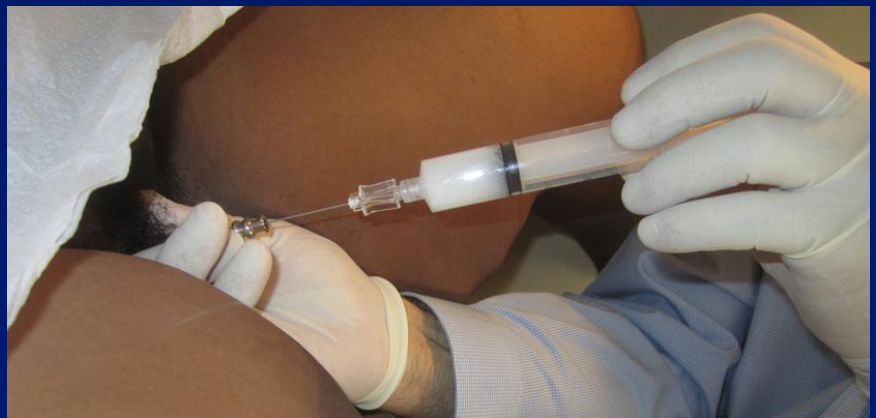


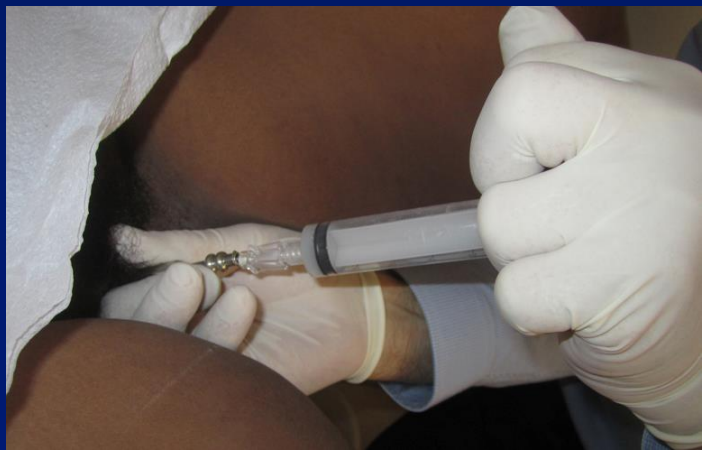


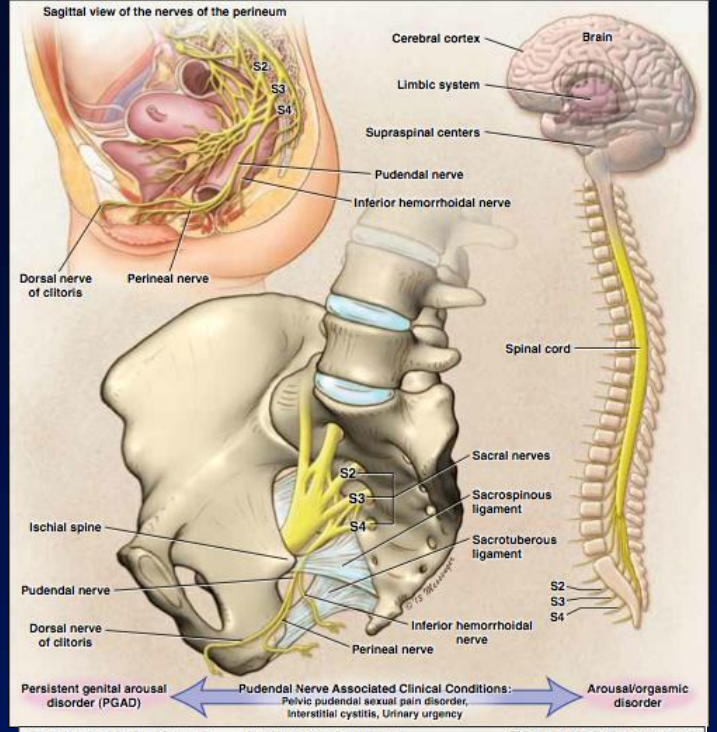

Select
Povidone Iodine, USP Swabsticks (1%)
Select
Povidone Iodine, USP Swabsticks (1%)

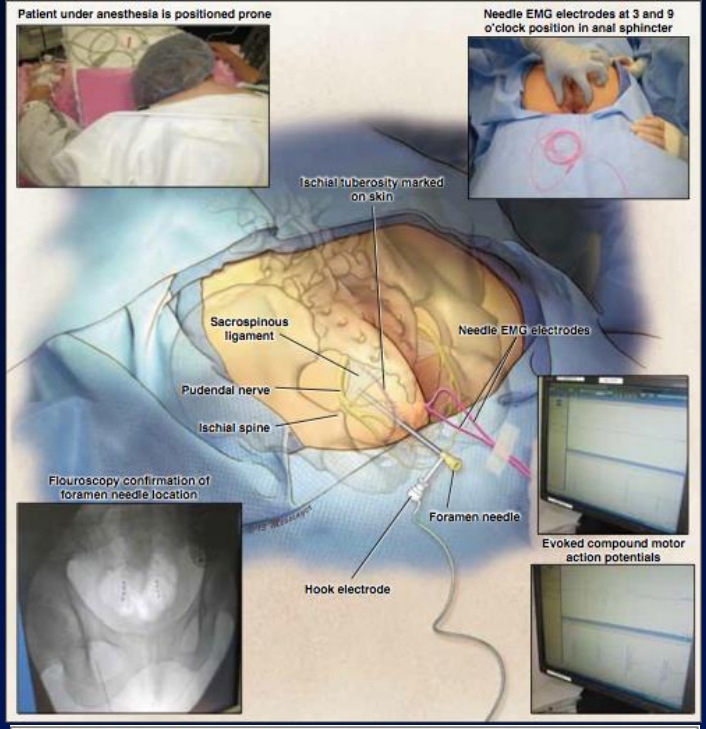


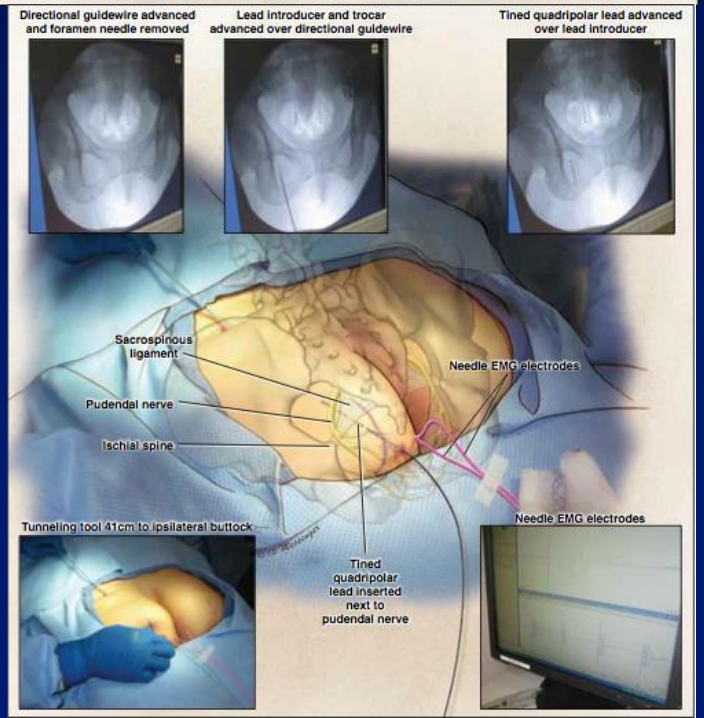


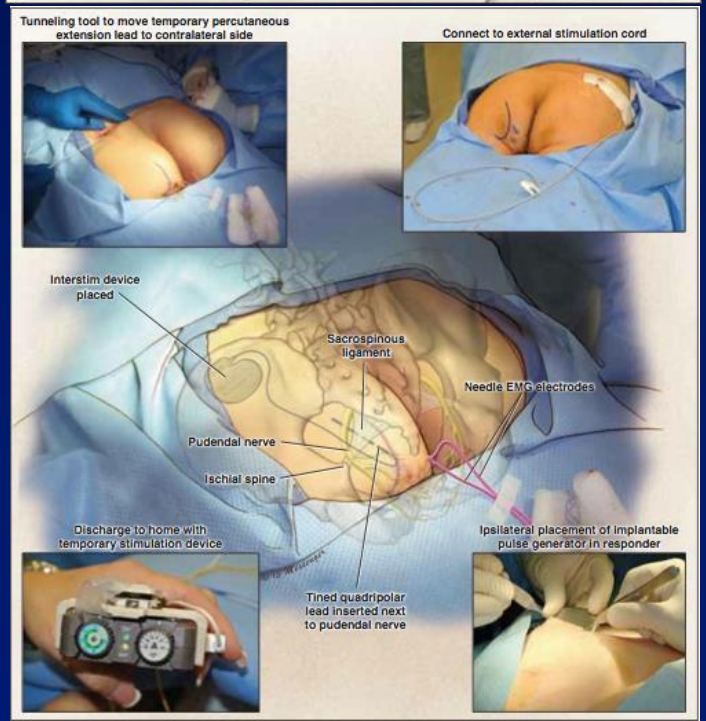





Sagittal view of the nerves of the perineum
S2
S3
S4
Cerebral cortex
Brain
Limbic system
Supraspinal centers
Pudendal nerve
Inferior hemorrhoidal nerve
Dorsal nerve of clitoris
Perineal nerve
Spinal cord
Sacral nerves
Sacrospinous ligament
Sacrotuberous ligament
Ischial spine
Pudendal nerve
Dorsal nerve of clitoris
Inferior hemorrhoidal nerve
Perineal nerve
Persistent genital arousal disorder (PGAD)
Pudendal Nerve Associated Clinical Conditions:
Pelvic pudendal sexual pain disorder,
Interstitial cystitis, Urinary urgency
Arousal/orgasmic disorder


Patient under anesthesia is positioned prone
Needle EMG electrodes at 3 and 9 o'clock position in anal sphincter
Ischial tuberosity marked on skin
Sacrospinous ligament
Needle EMG electrodes
Pudendal nerve
Ischial spine
Flouroscopy confirmation of foramen needle location
Foramen needle
Evoked compound motor action potentials
Hook electrode


Directional guidewire advanced and foramen needle removed
Lead introducer and trocar advanced over directional guidewire
Tined quadripolar lead advanced over lead introducer
Sacrospinous ligament
Needle EMG electrodes
Pudendal nerve
Ischial spine
Tunneling tool 41cm to ipsilateral buttock
Tined quadripolar lead inserted next to pudendal nerve
Needle EMG electrodes


Tunneling tool to move temporary percutaneous extension lead to contralateral side
Connect to external stimulation cord
Interstim device placed
Sacrospinous ligament
Needle EMG electrodes
Pudendal nerve
Ischial spine
Discharge to home with temporary stimulation device
Tined quadripolar lead inserted next to pudendal nerve
Ipsilateral placement of implantable pulse generator in responder

Persistent Genital Arousal Disorder (PGAD):

a) altered pre-menopausal hormone integrity – hormonally mediated provoked vestibulodynia
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h) peri-urethral glans pathology
i) clitorodynia
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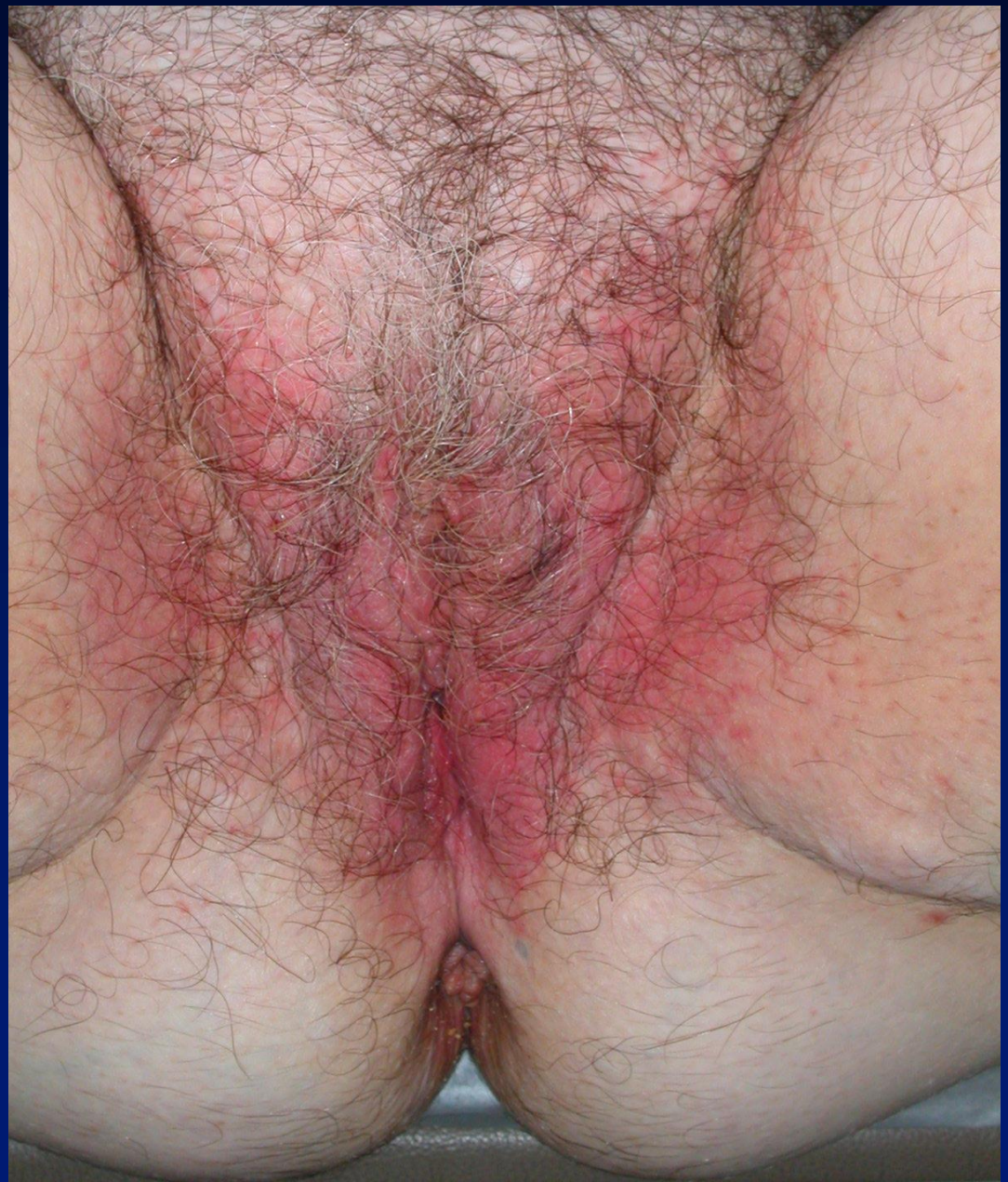
k) arterio-venous malformation
l) S2 Tarlov cyst
m) high tone pelvic floor dysfunction

Candida Infection



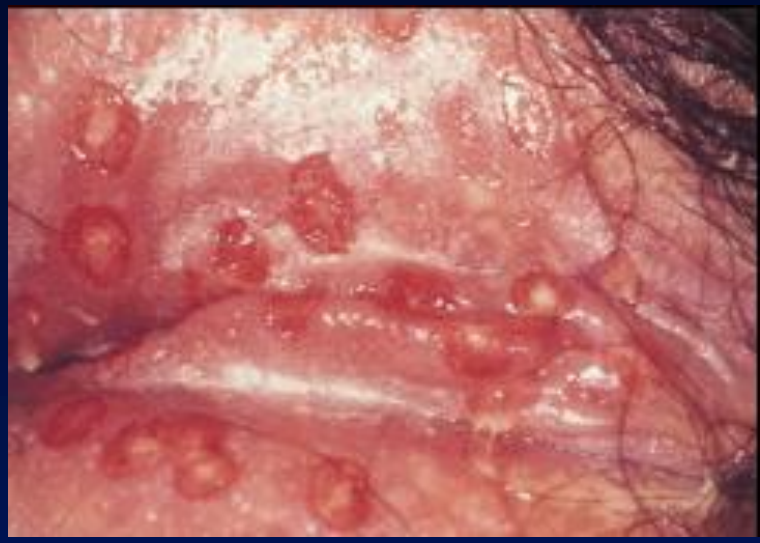
Genital herpes is a sexually transmitted disease caused by a herpes virus.

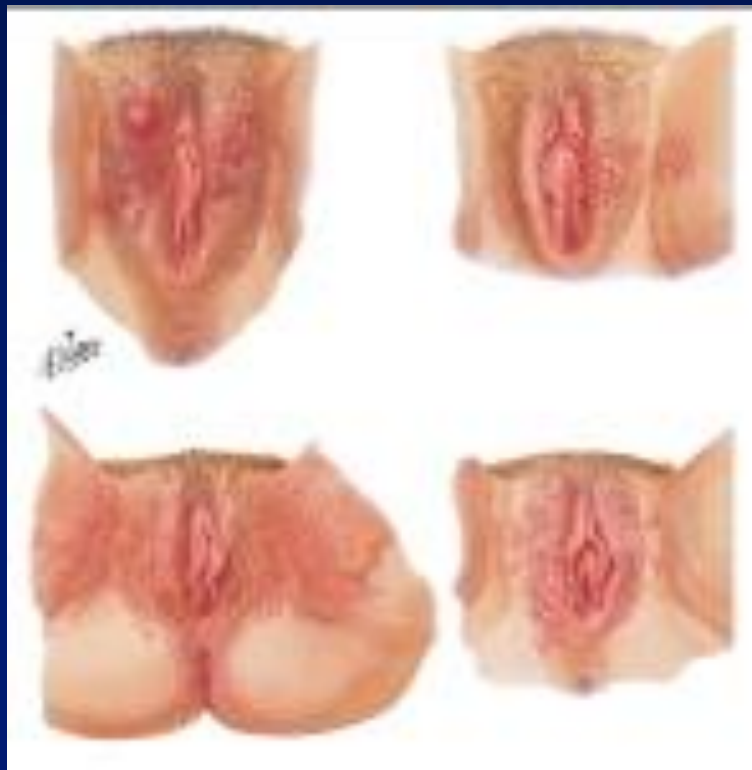
The disease is characterized by the formation of fluid-filled, painful blisters in the genital area.

Herpes may be spread by vaginal, anal, and oral sexual activity. It is not spread by objects (such as a toilet seat or doorknob), swimming pools, hot tubs, or through the air.

Genital herpes is a disease resulting from an infection by a herpes simplex virus.

There are eight different kinds of human herpes viruses. Only two of these, herpes simplex types 1 and 2, can cause genital herpes





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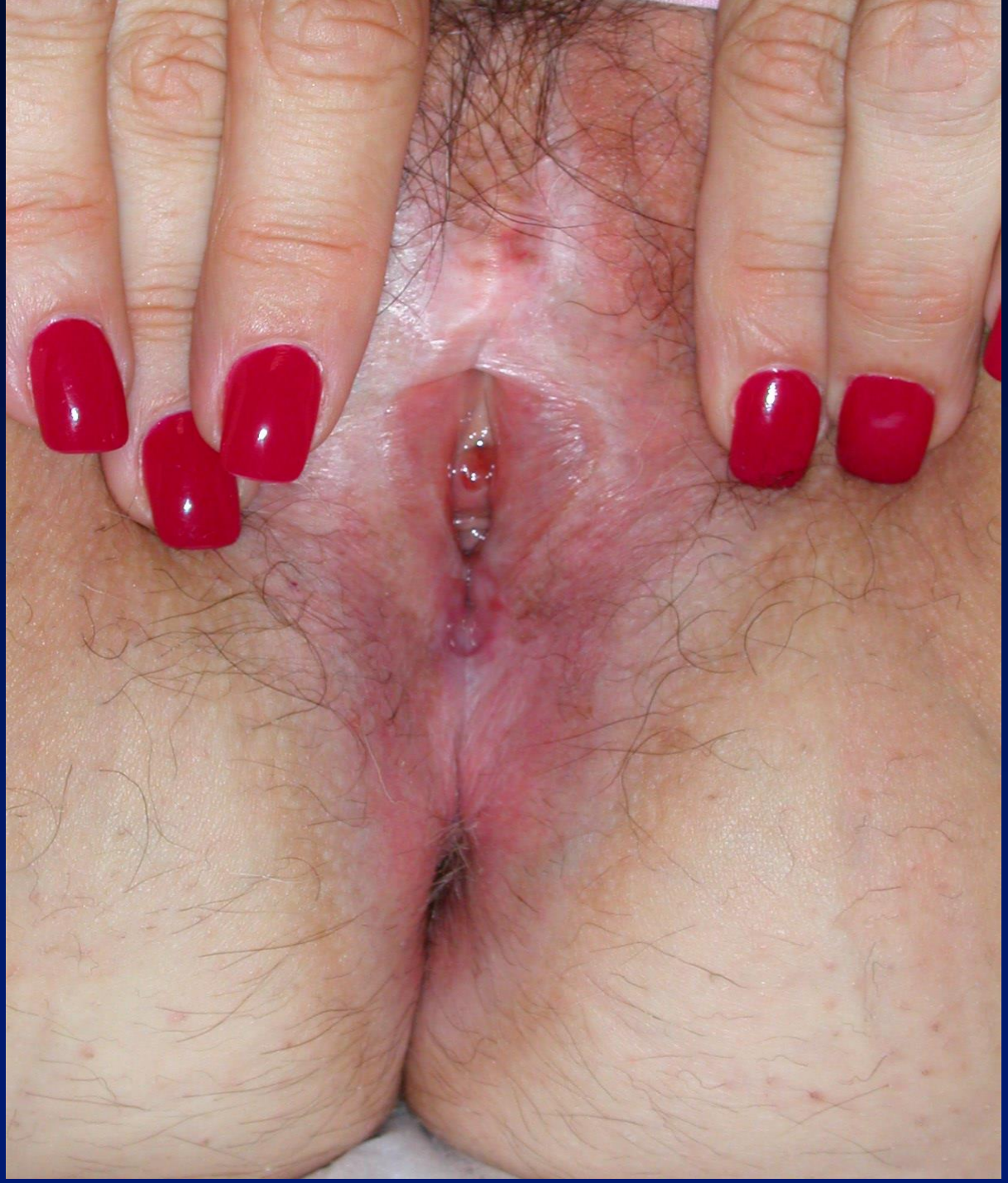
Lichen Sclerosus (LS)



Erosive Lichen Planus

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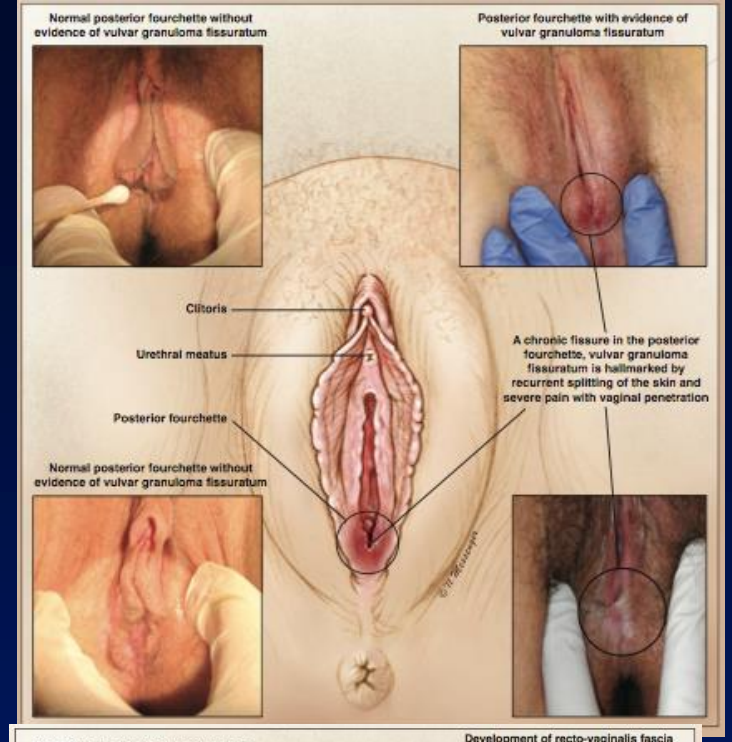
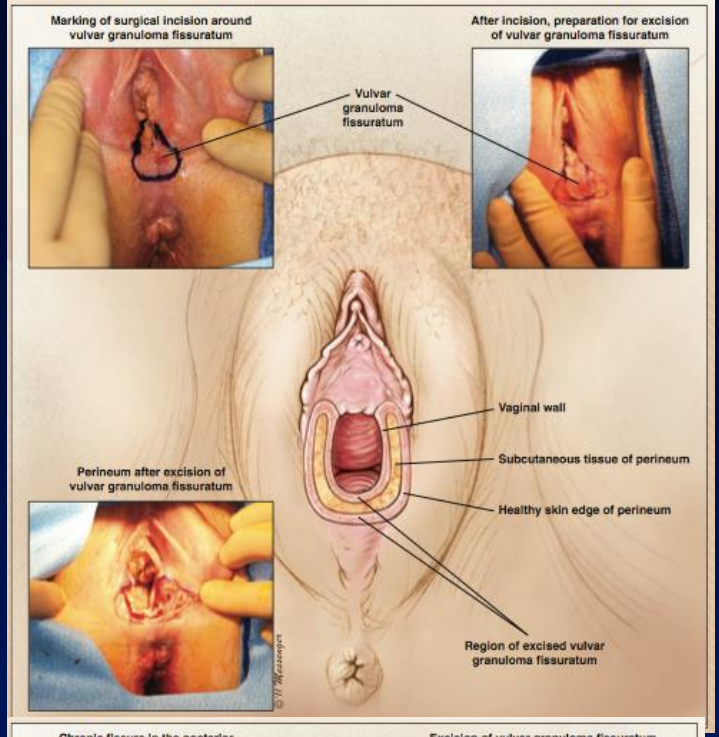
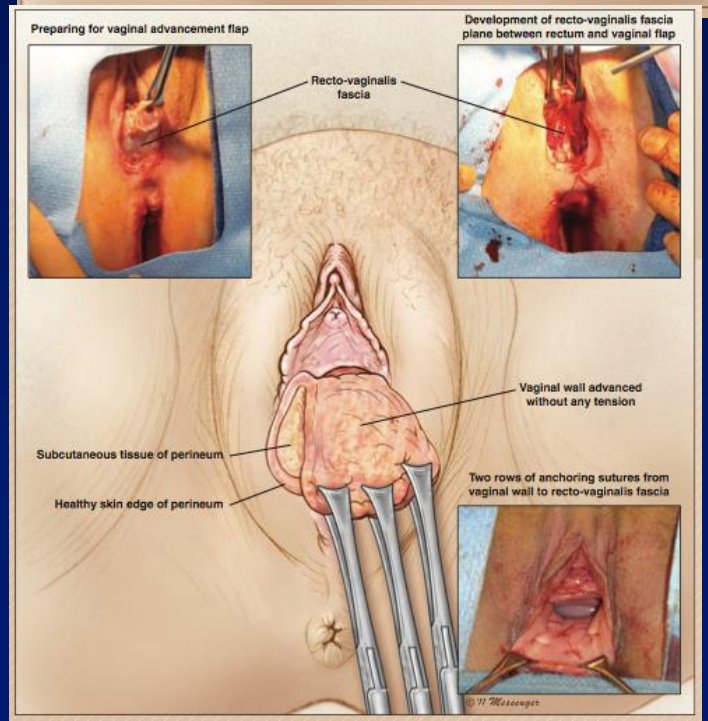
INTROITAL DYSPAREUNIA
Vulvar granuloma fissuratum

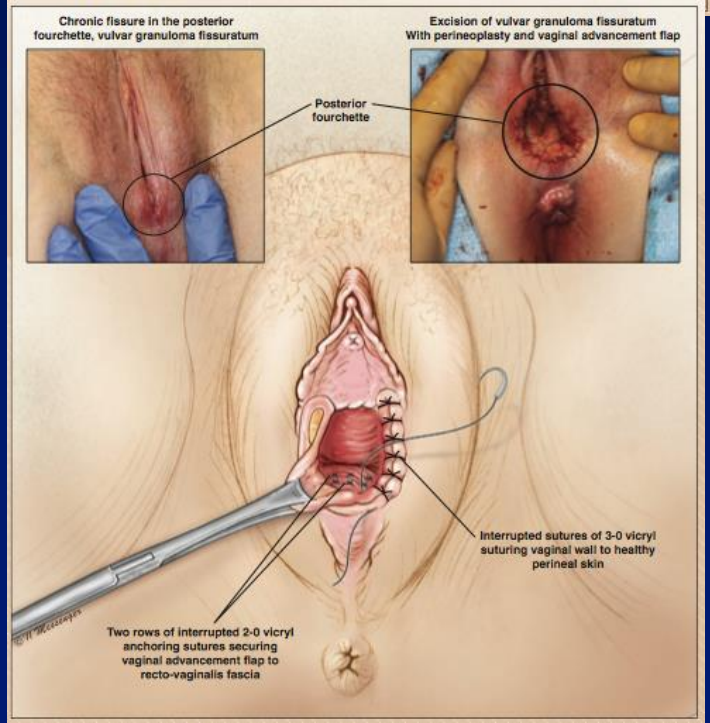
Surgical Techniques

Perineoplasty and Vaginal Advancement Flap for Vulvar Granuloma Fissuratum









J Sex Med 2011;8:2984–2987

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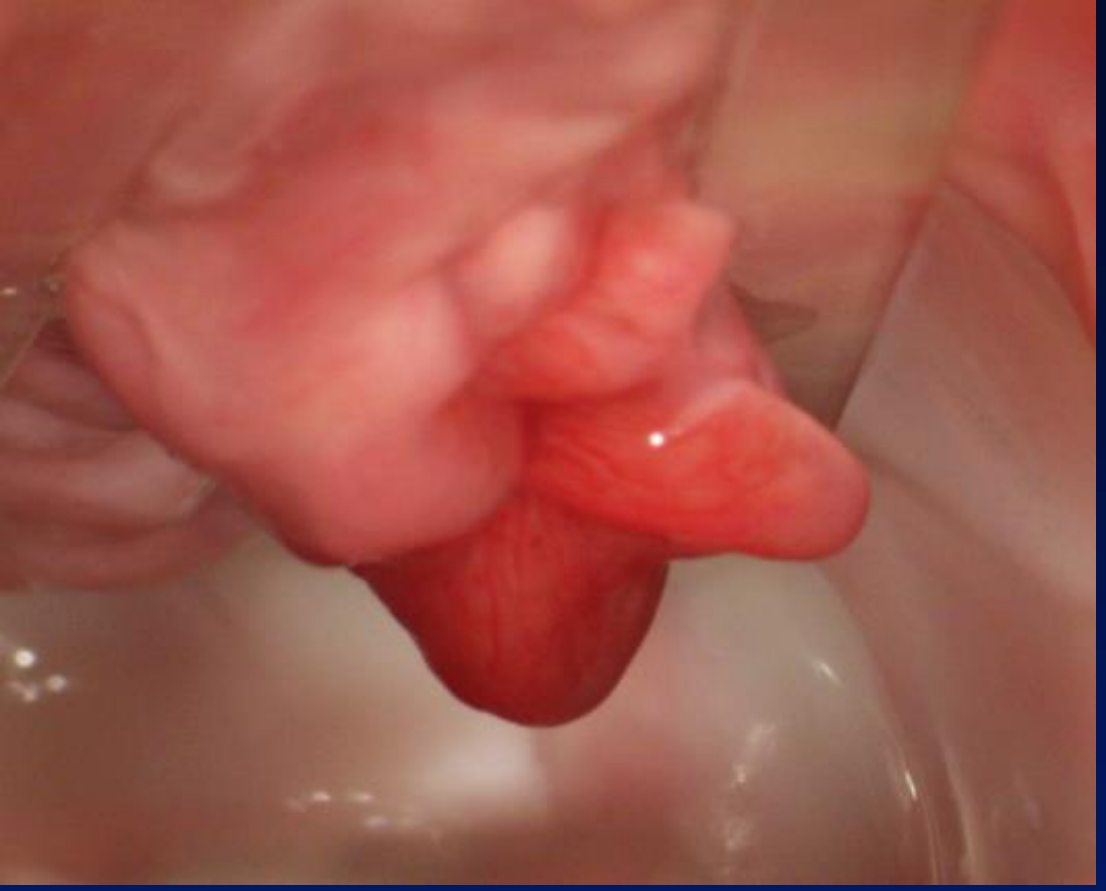

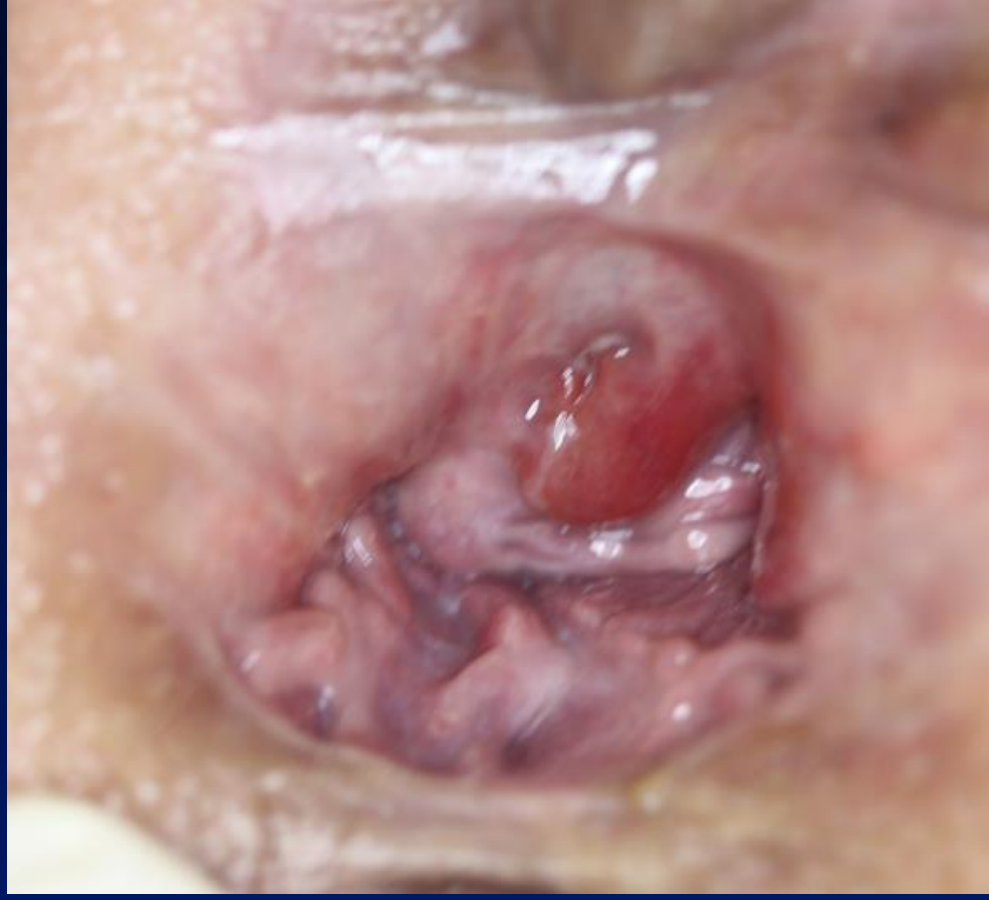

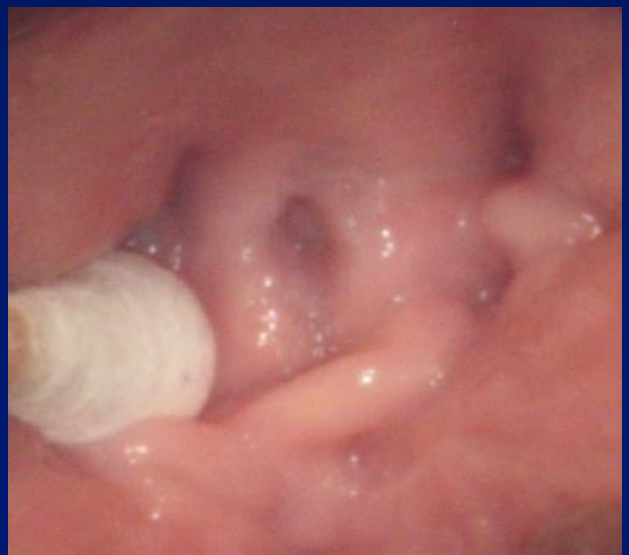

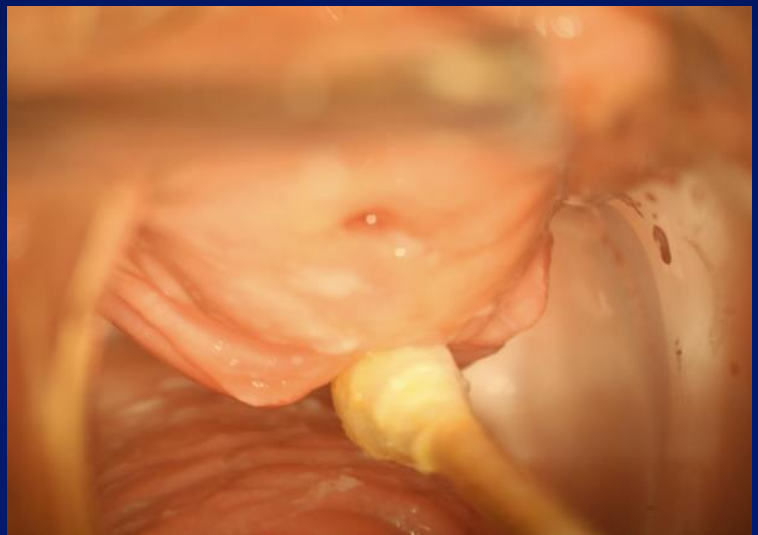

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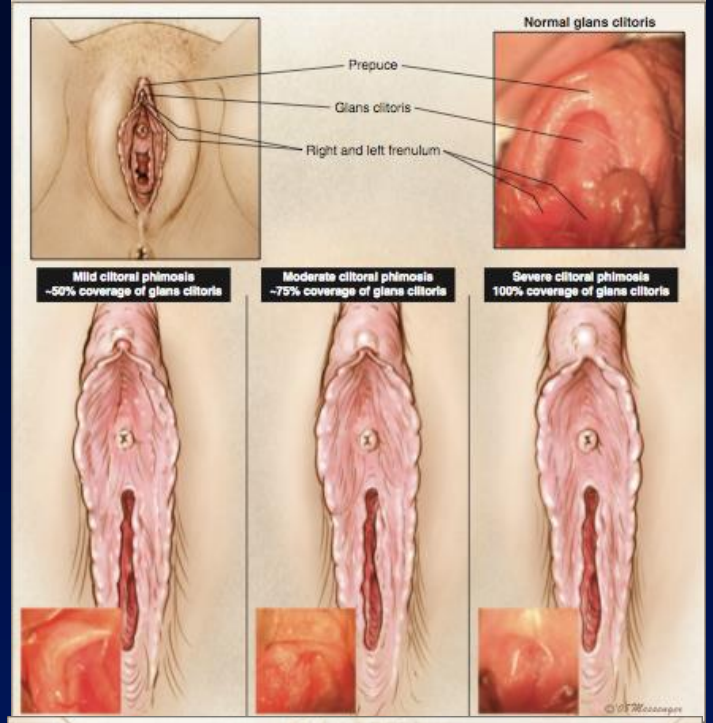
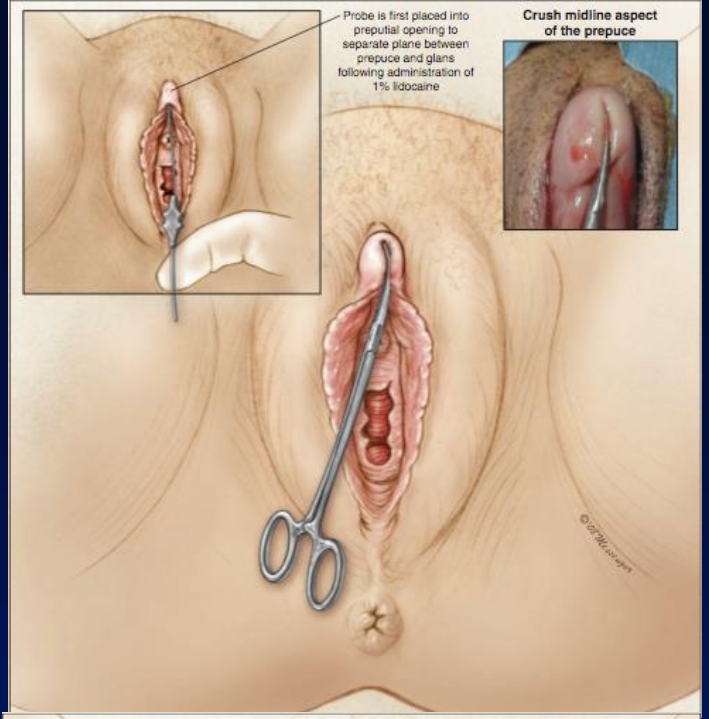
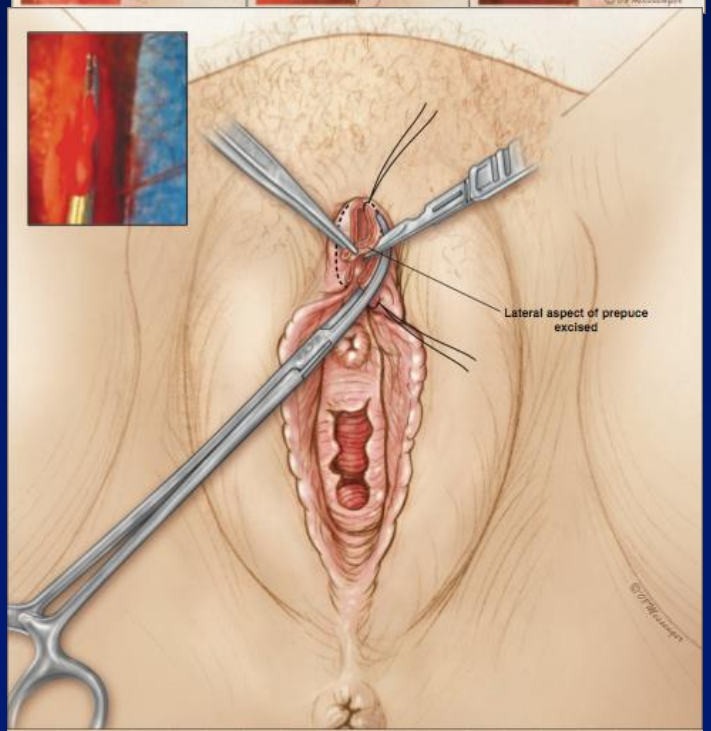
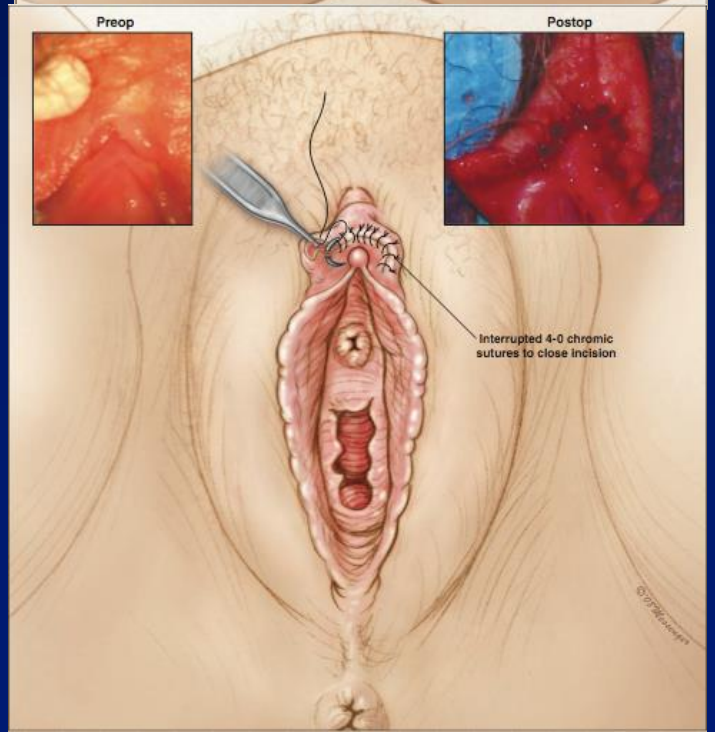
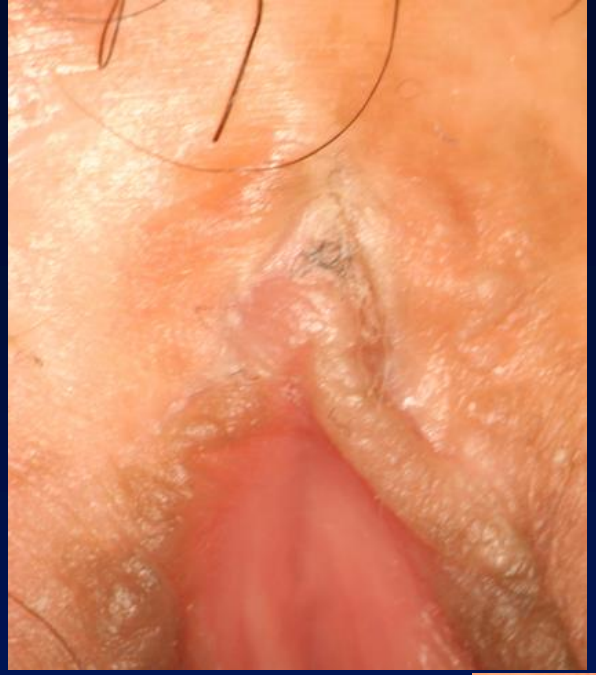
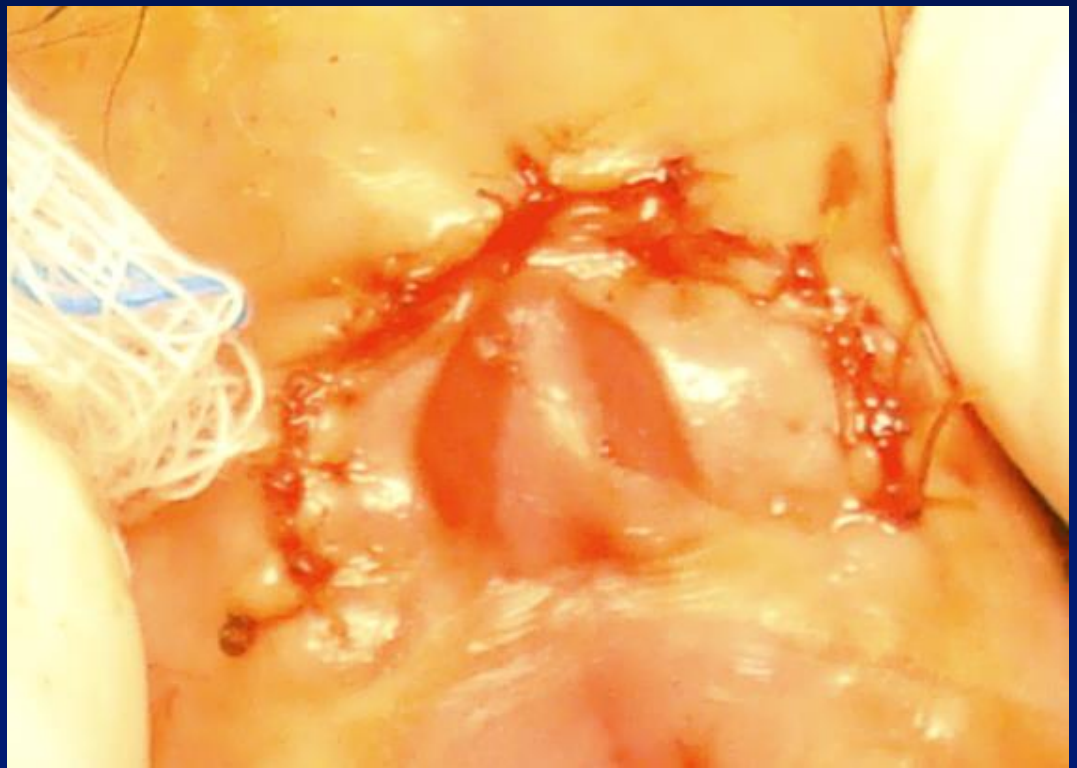

Normal glans clitoris
Prepuce
Glans clitoris
Right and left frenulum
Mild clitoral phimosis
~50% coverage of glans clitoris
Moderate clitoral phimosis
~75% coverage of glans clitoris
Severe clitoral phimosis
100% coverage of glans clitoris

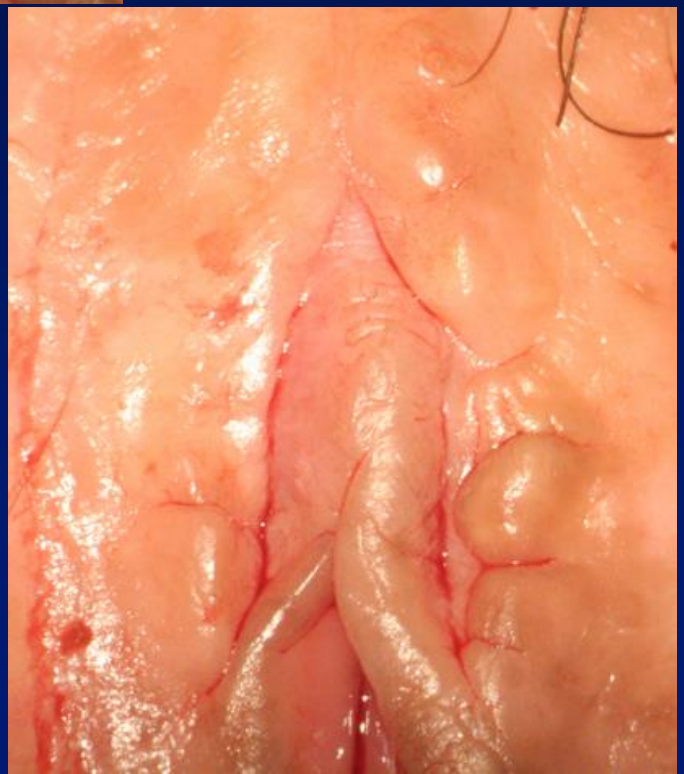

Probe is first placed into preputial opening to separate plane between prepuce and glans following administration of 1% lidocaine
Crush midline aspect of the prepuce


Lateral aspect of prepuce excised


Preop
Postop
Interrupted 4-0 chromic sutures to close incision







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Pelvic Congestion Syndrome Presenting as Persistent Genital Arousal: A Case Report

J Sex Med 2008;5:504–508

Catherine Thorne, MBBS,* and Bronwyn Stuckey, FRACP*†‡

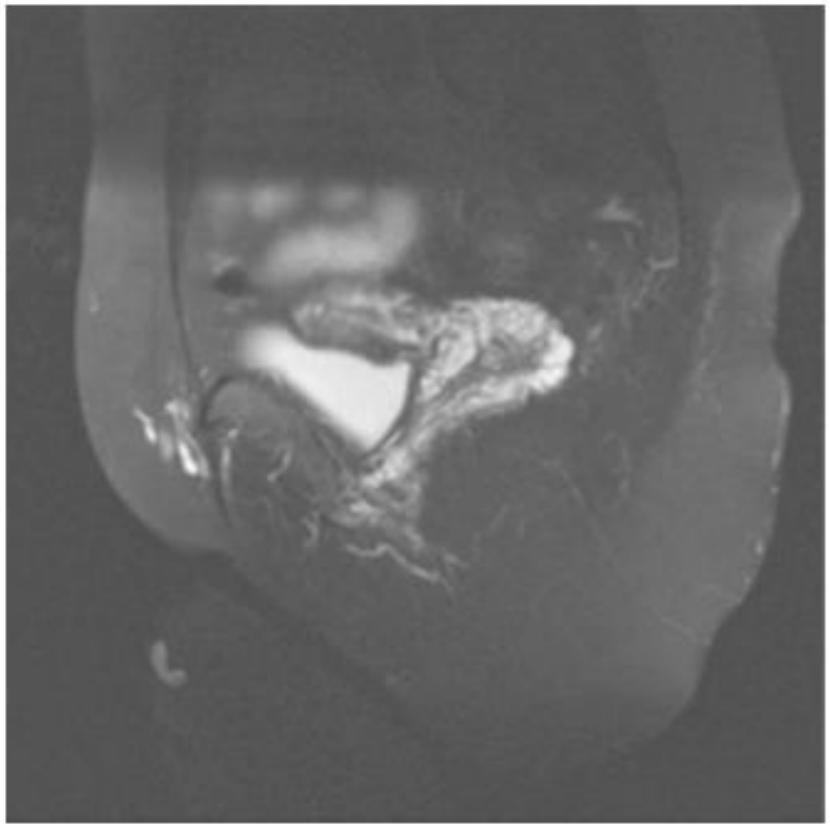

Figure 1 Magnetic resonance imaging scan with contrast enhancement shows extensive varices involving the entire vaginal wall, contiguous with the prominent parametrial veins. Varicosities are also seen in the anterior abdominal wall and in the anterior thigh.

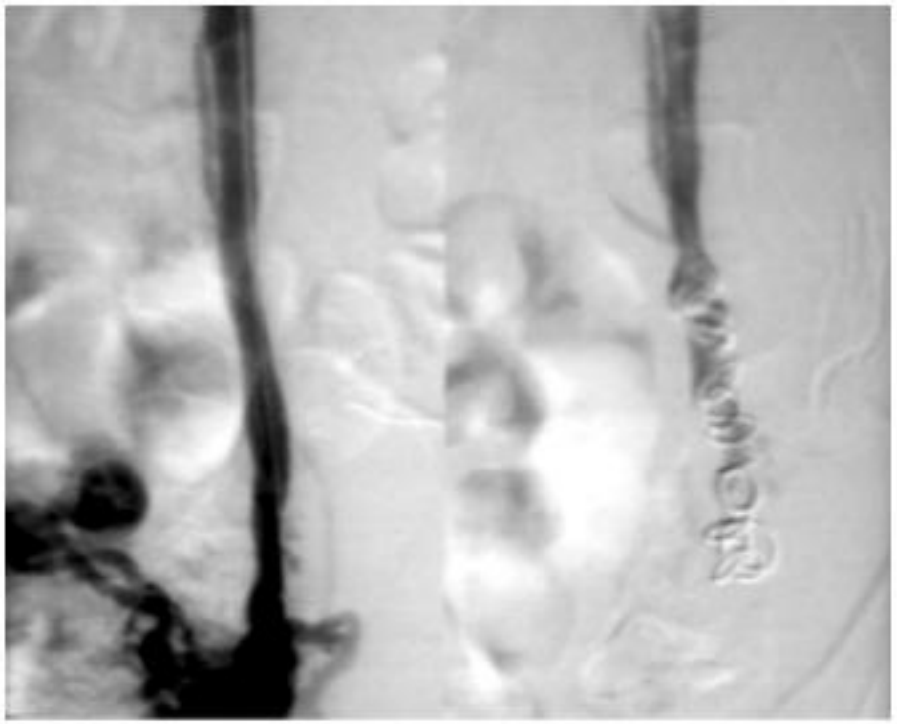

Figure 2 Venogram of the left ovarian vein shows retrograde flow and pelvic varices before embolization (left) and after embolization using stainless steel coils and 3% ethoxysclerol (right).

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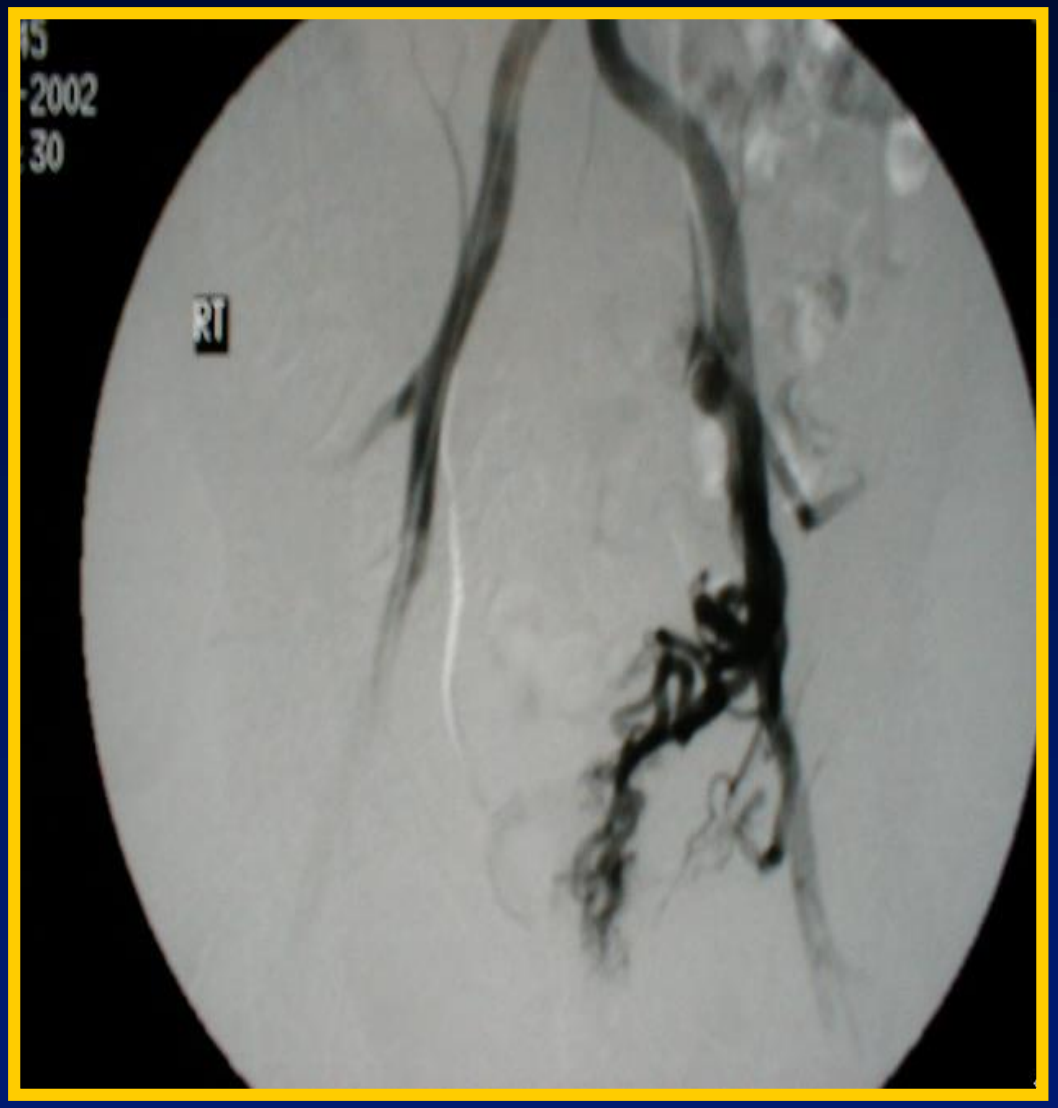
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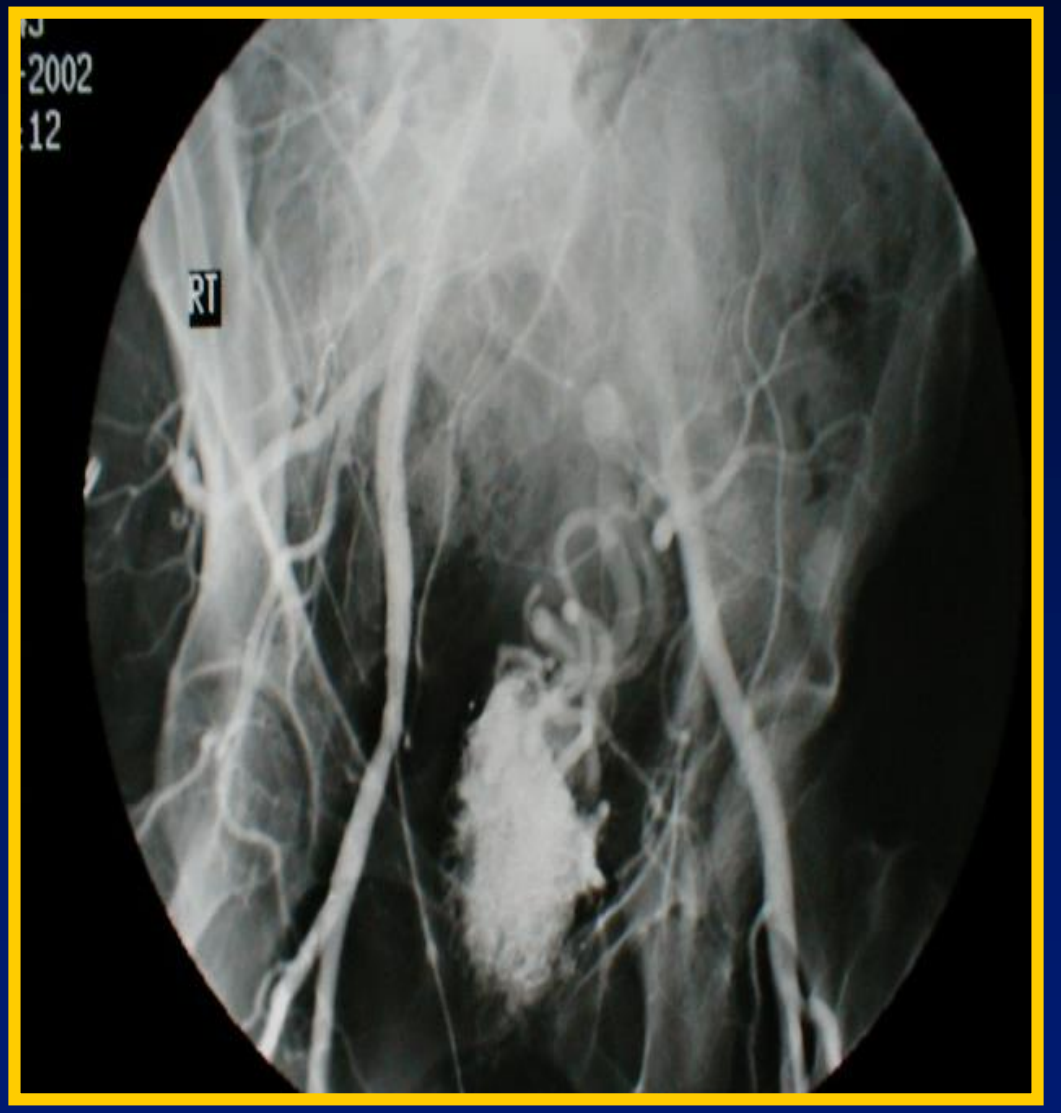
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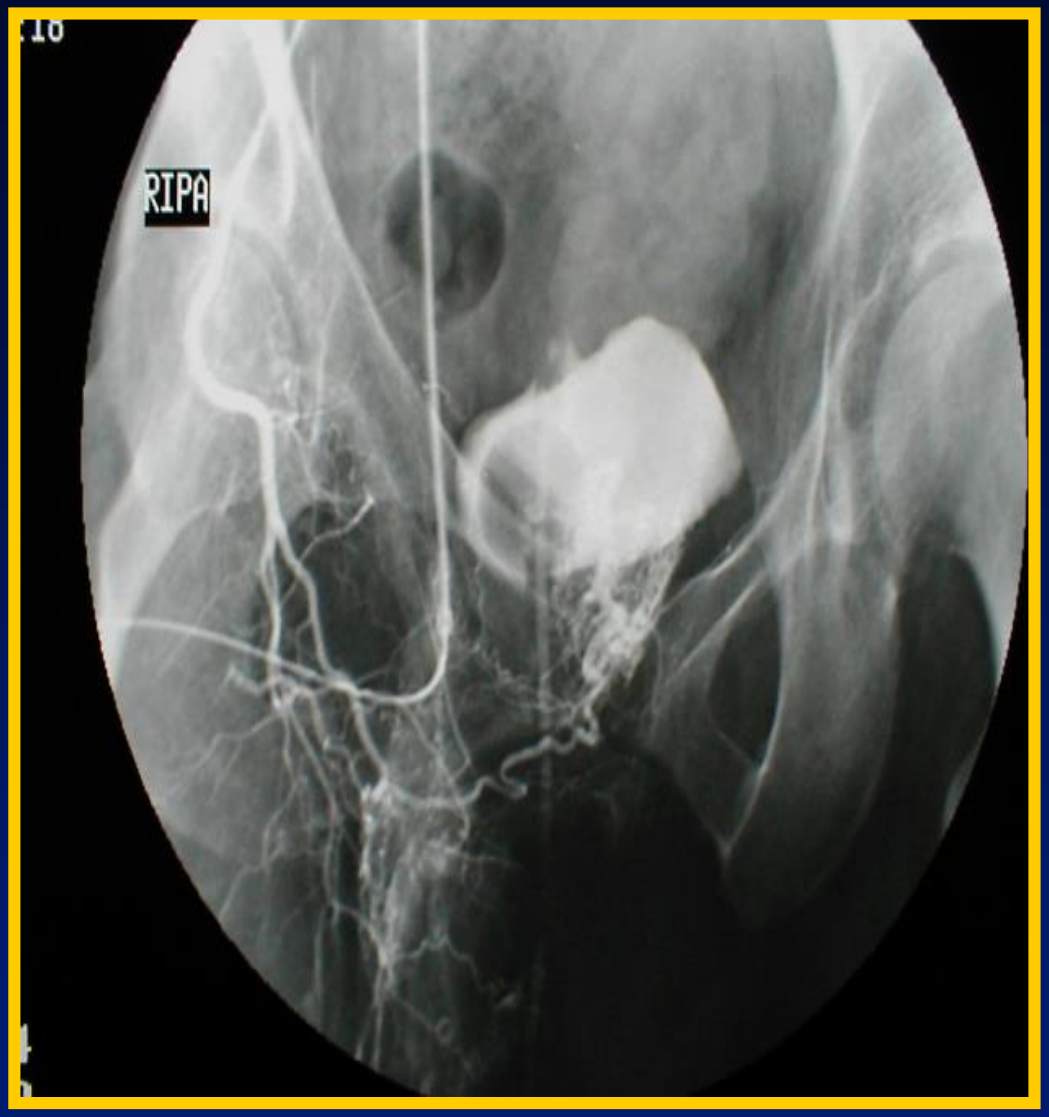
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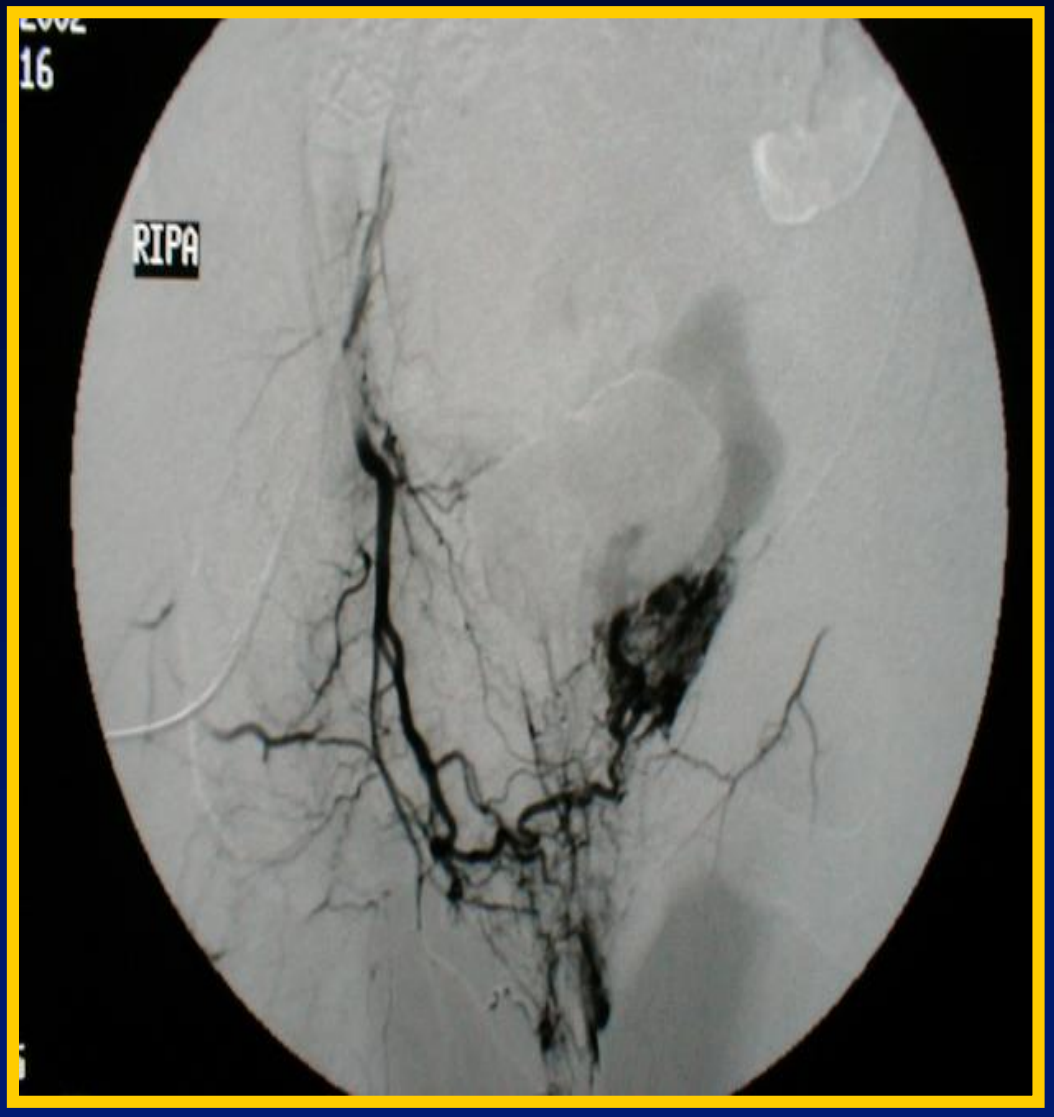
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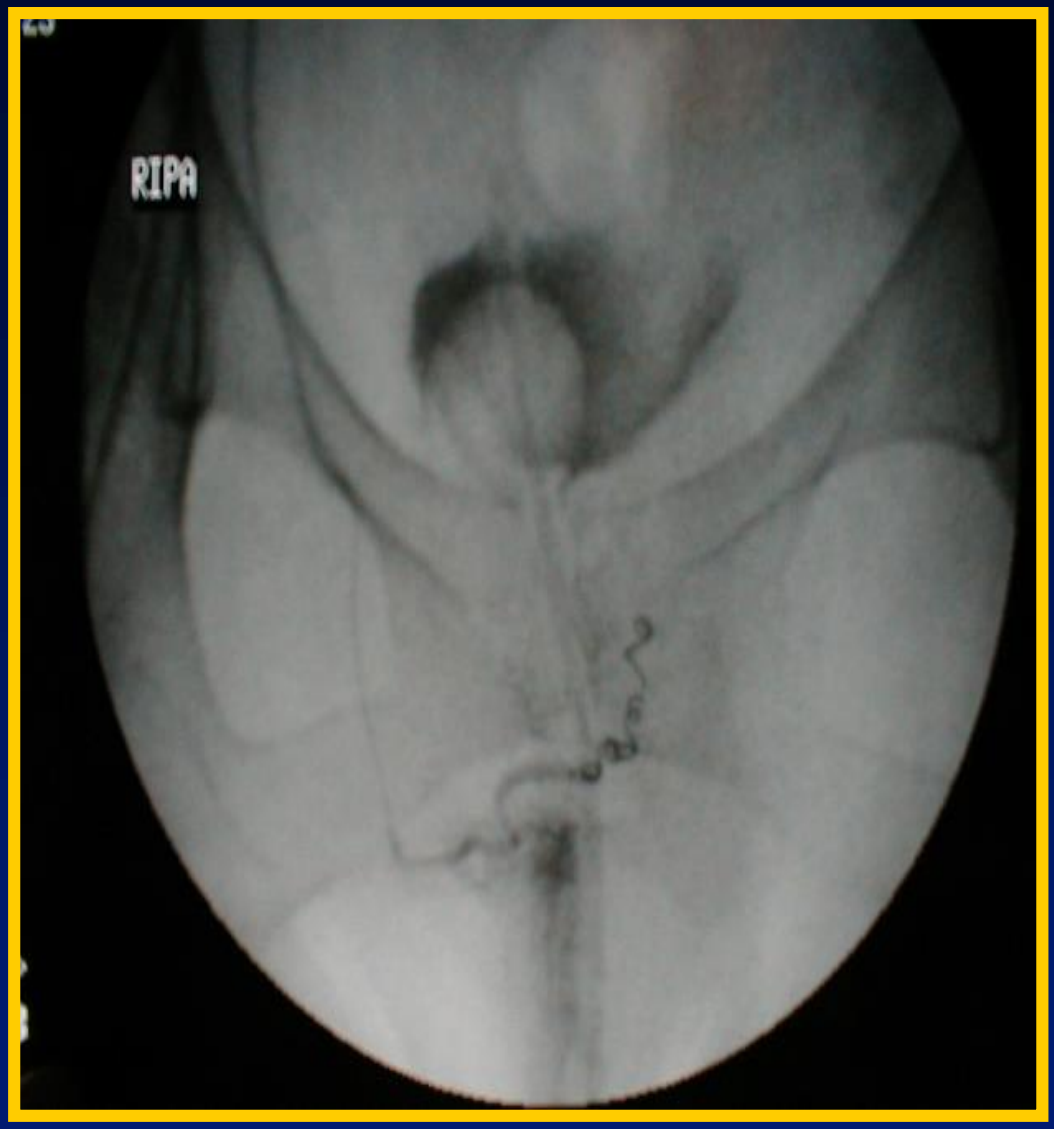
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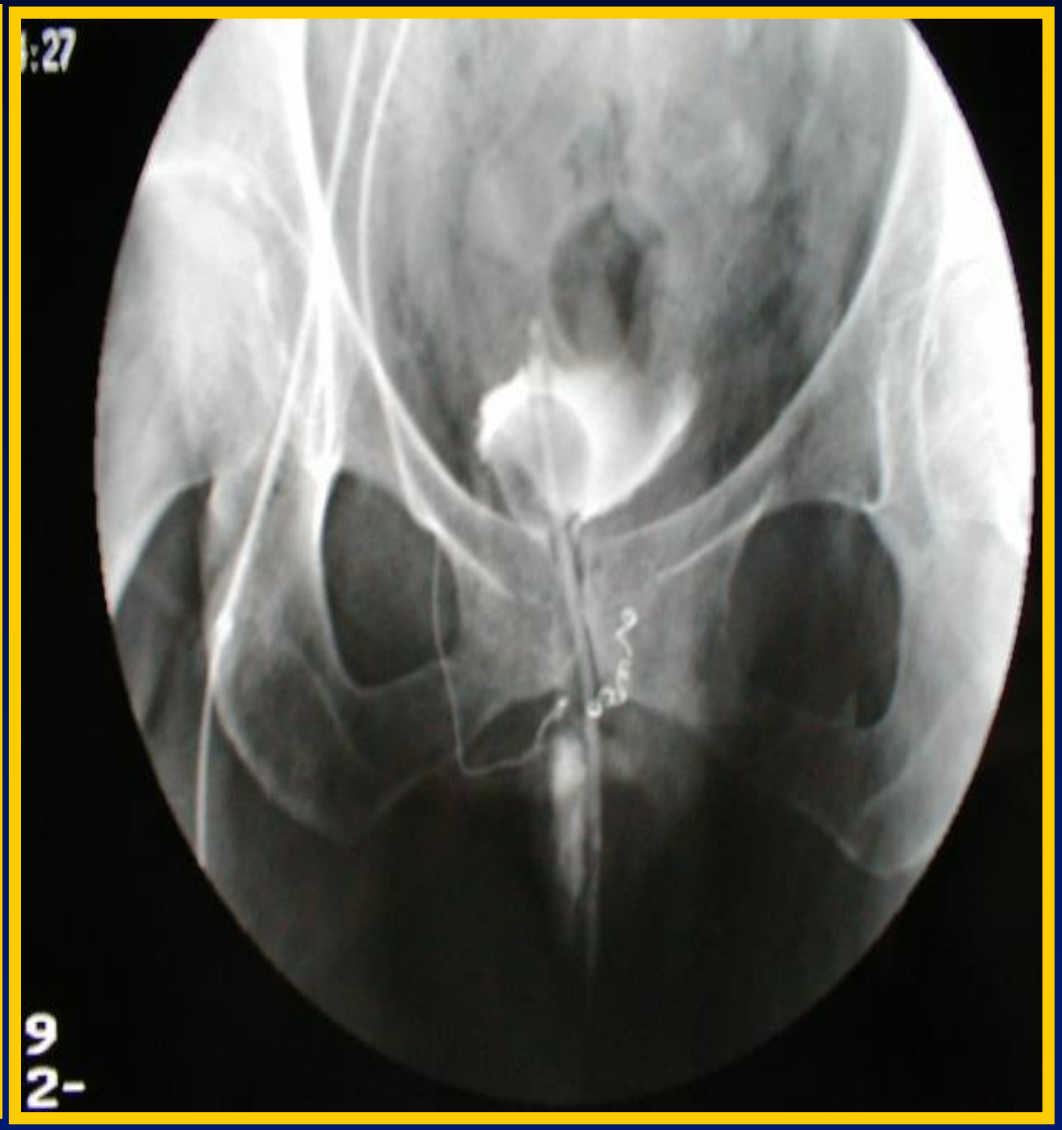
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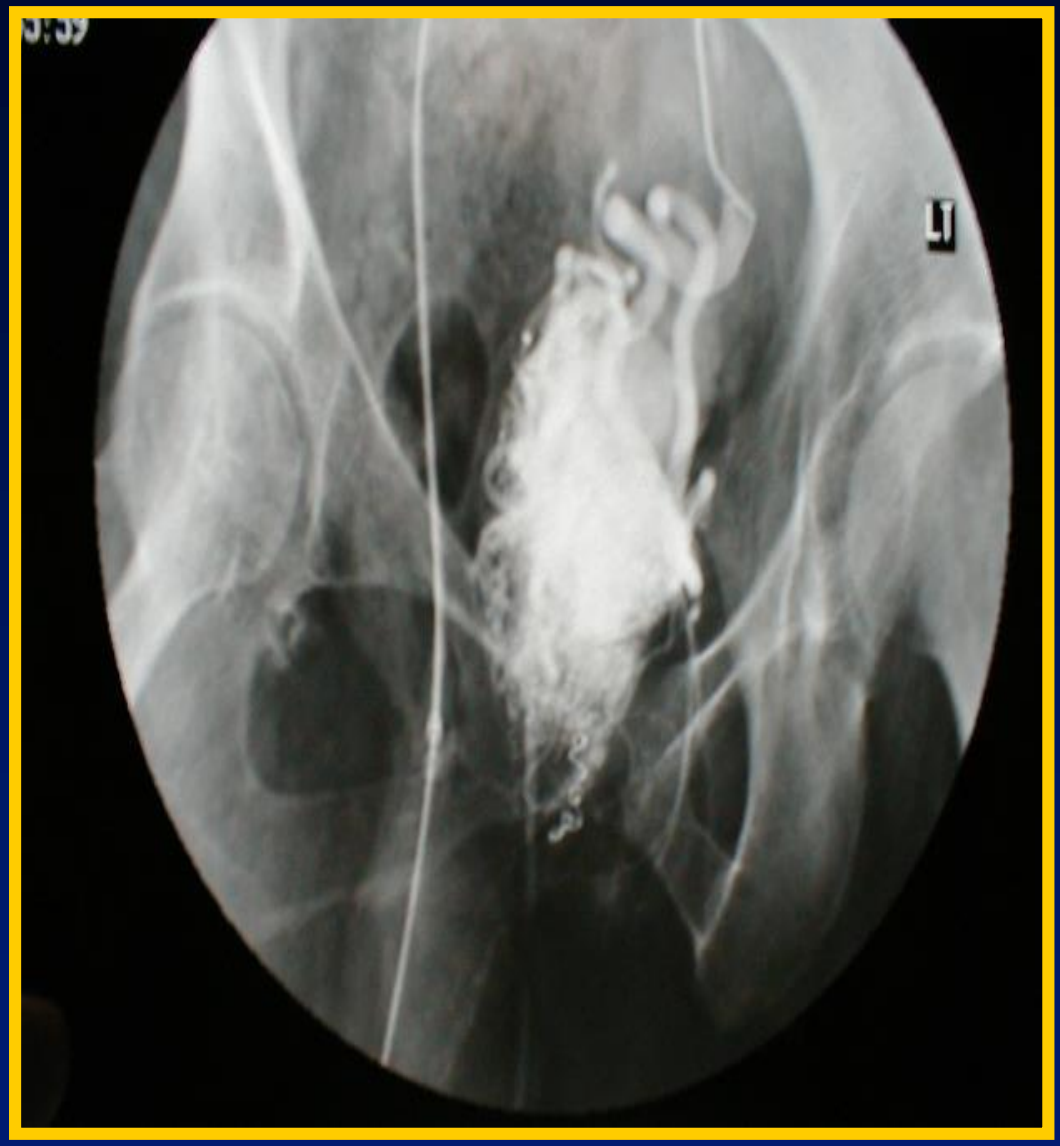
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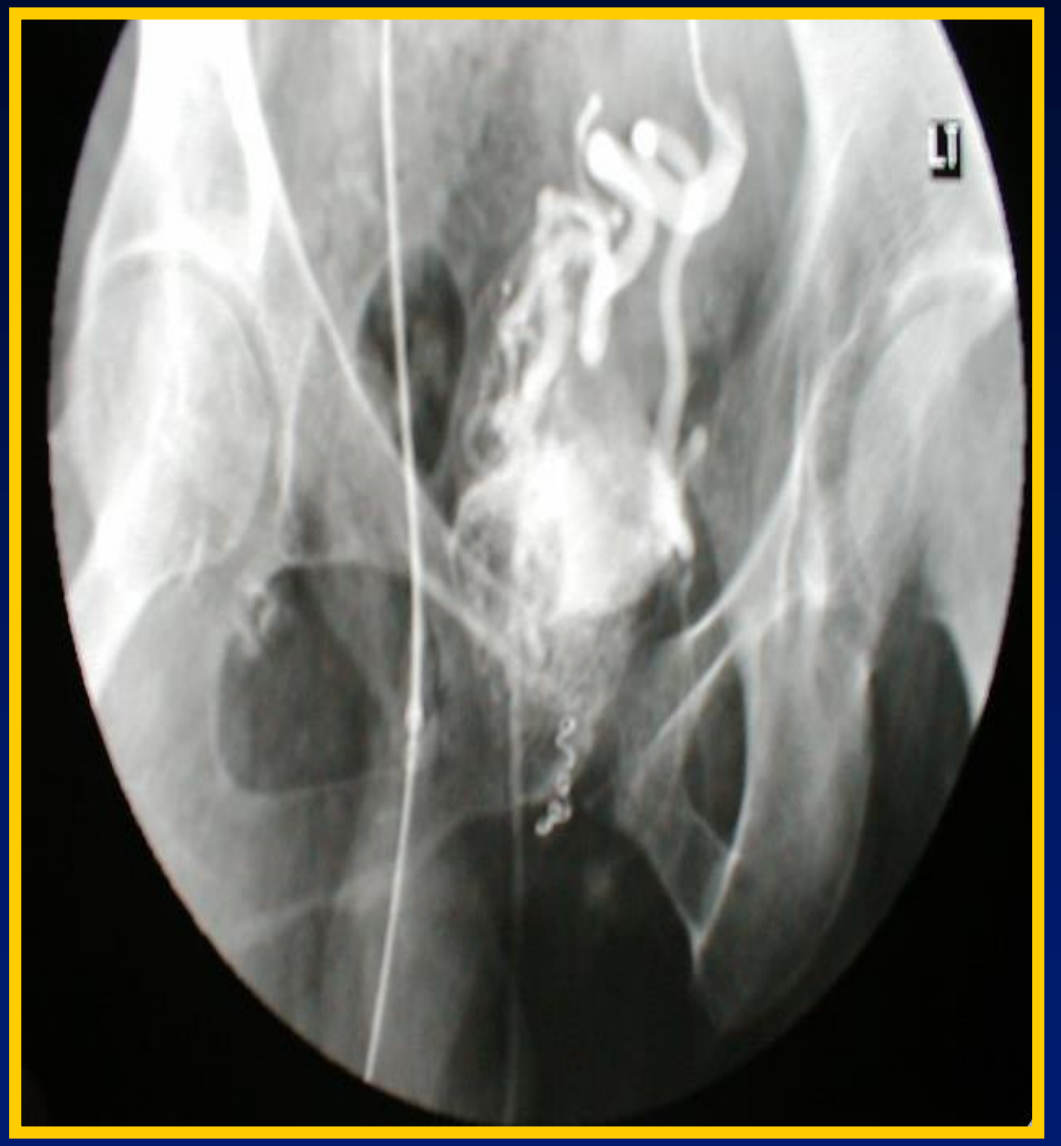
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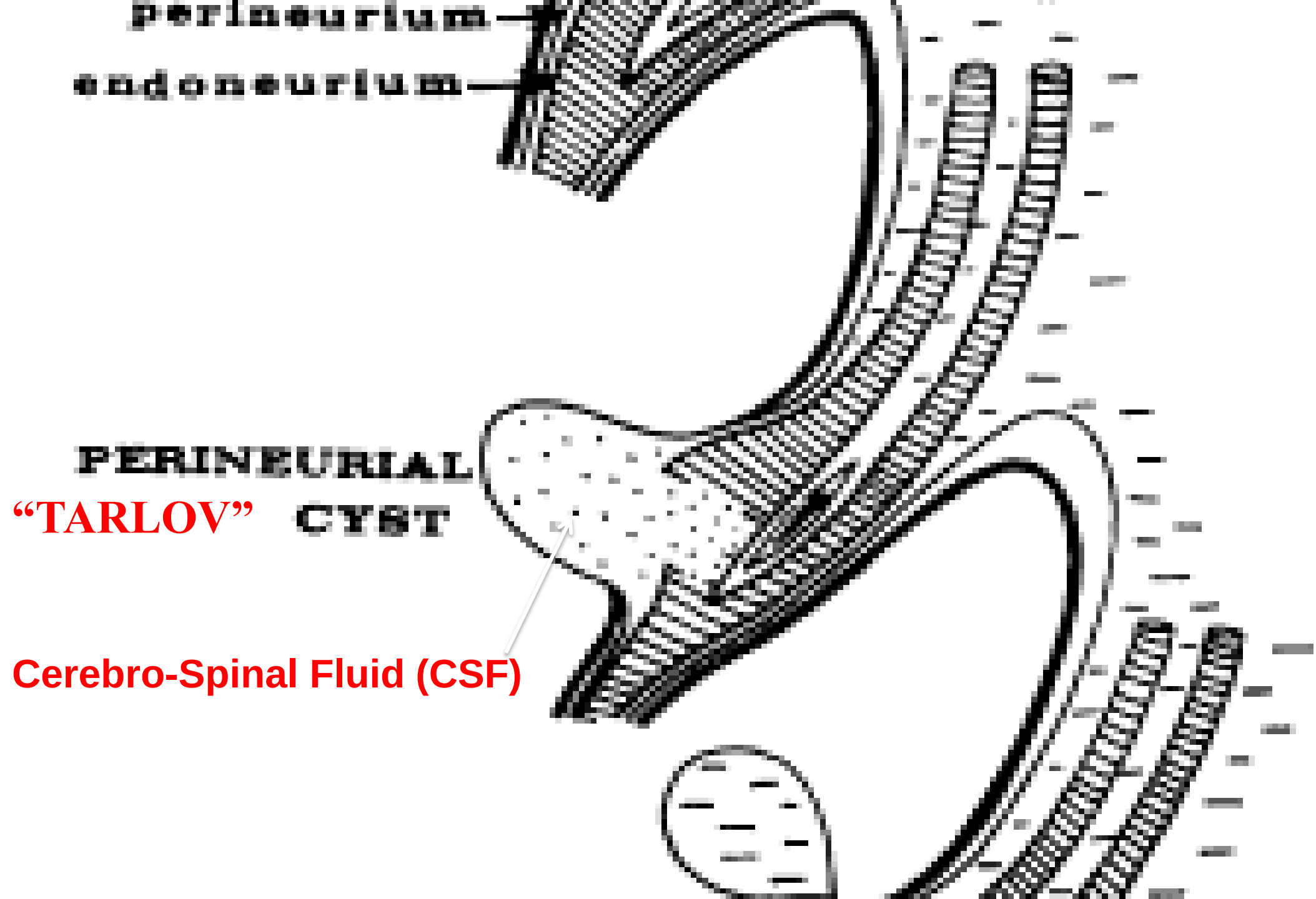
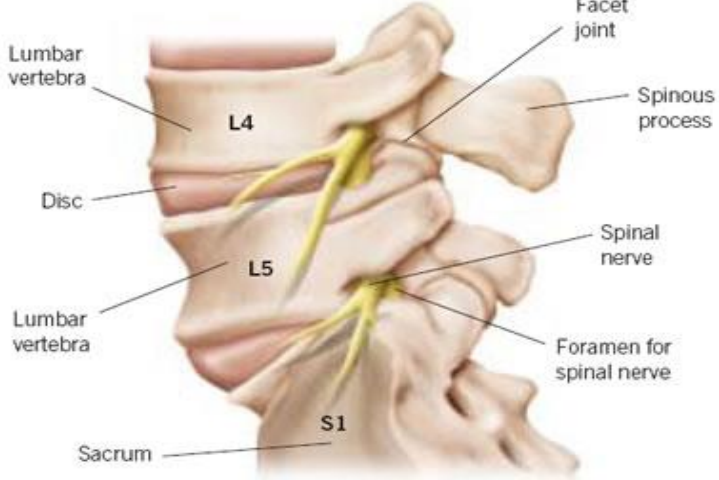
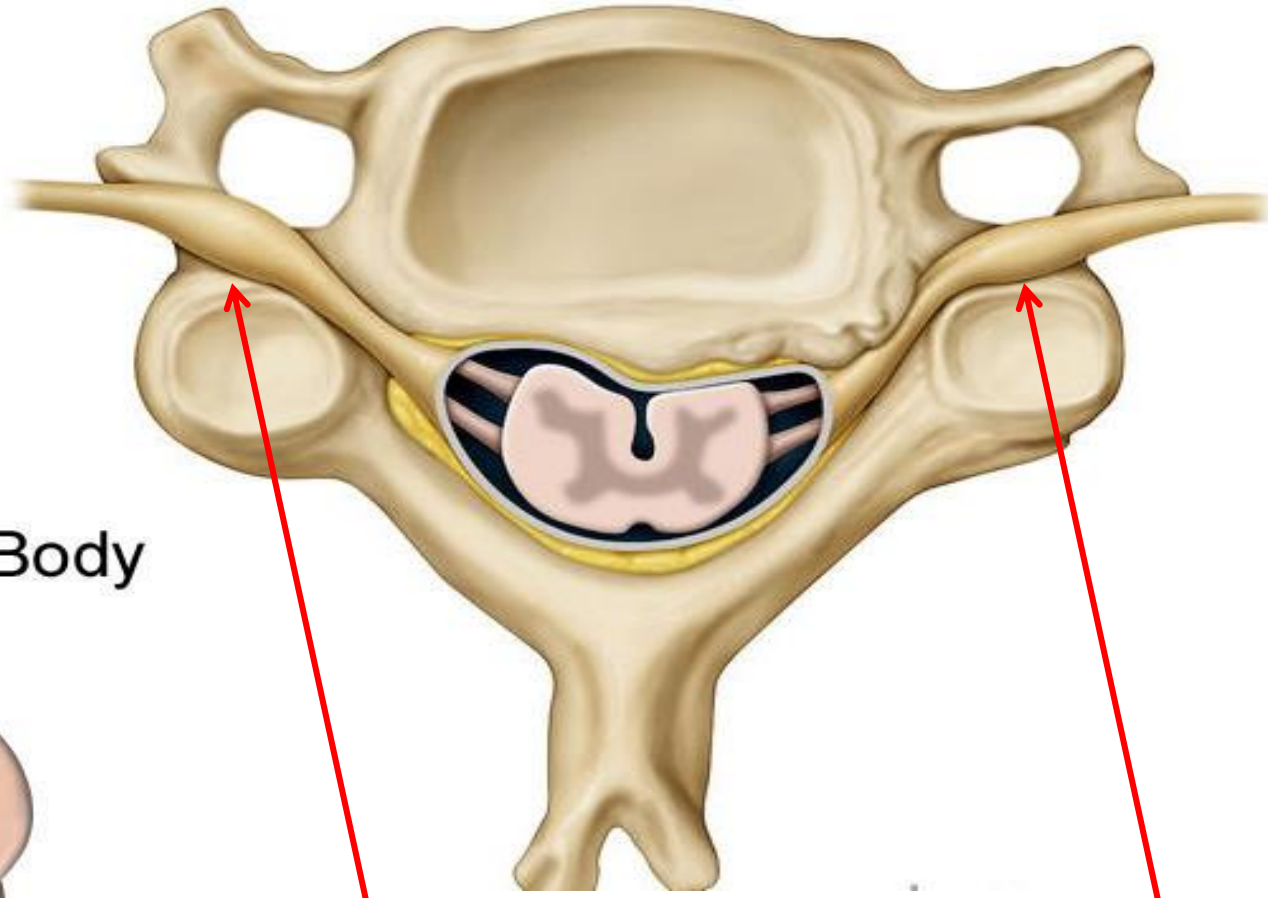
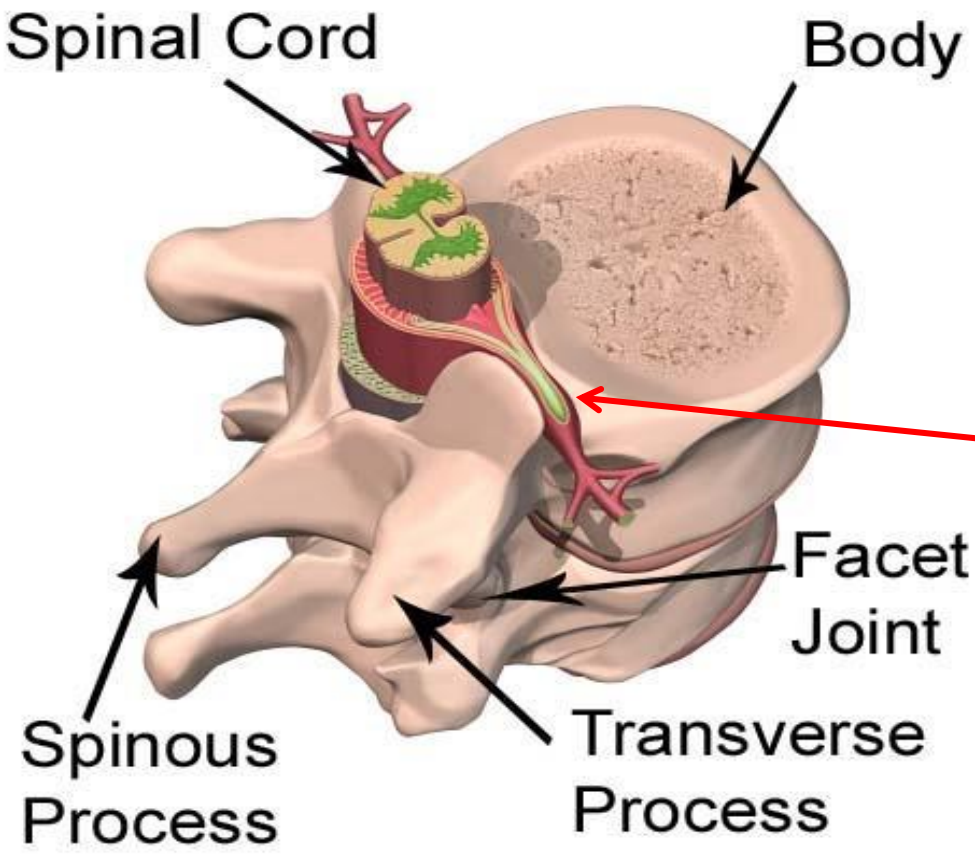

perineurium
endoneurium
PERINEURIAL
"TARLOV" CYST
Cerebro-Spinal Fluid (CSF)

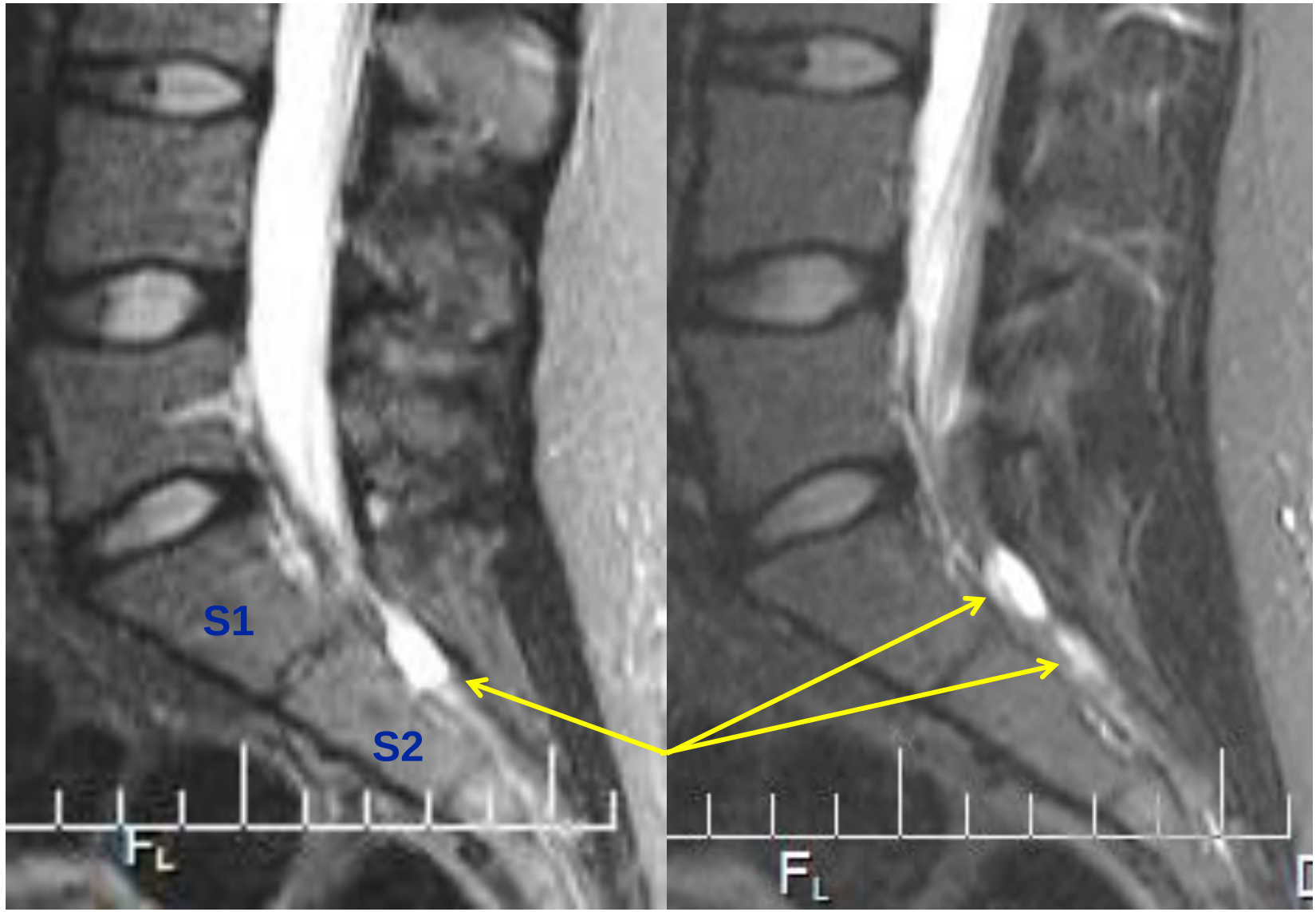




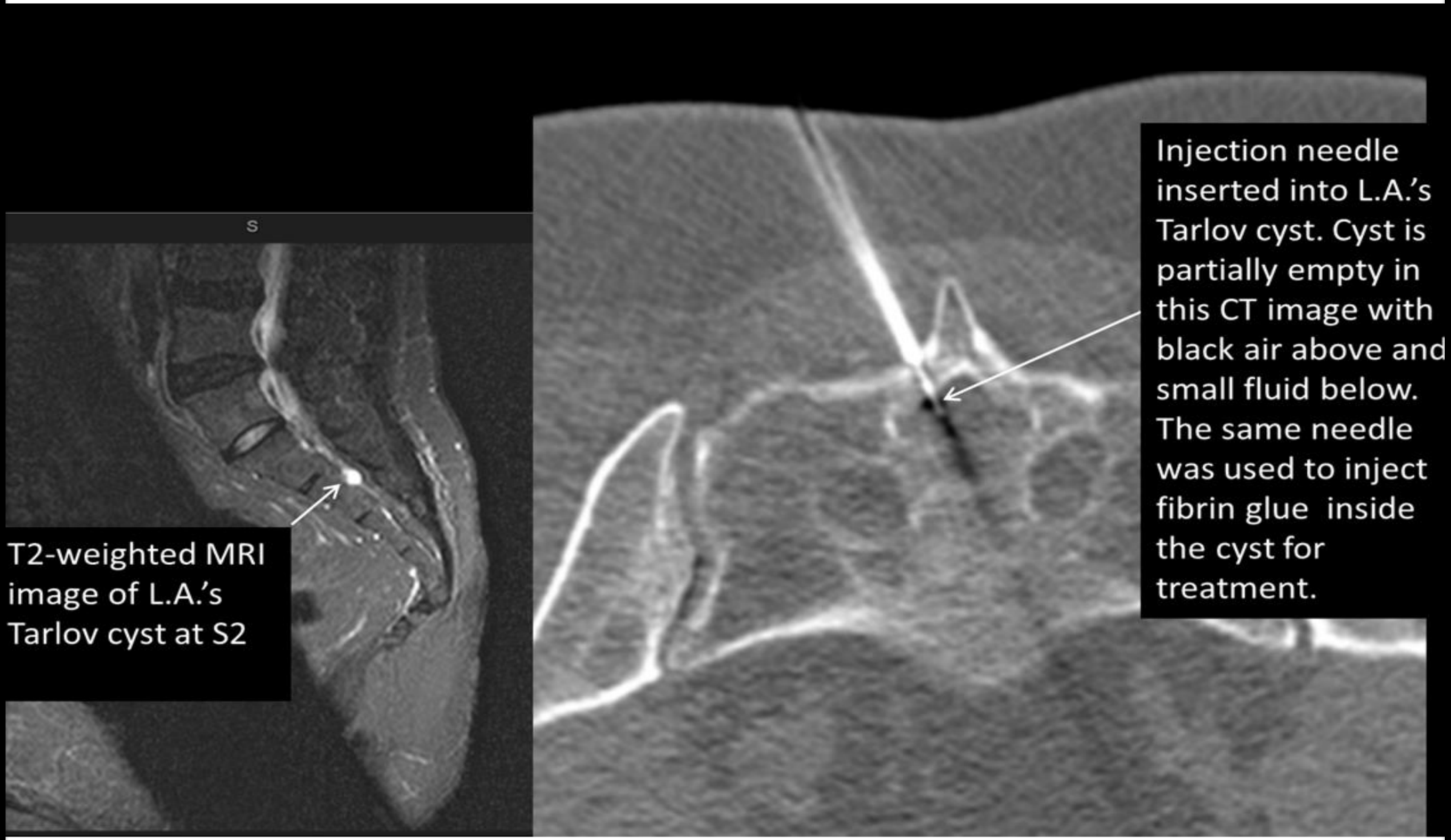


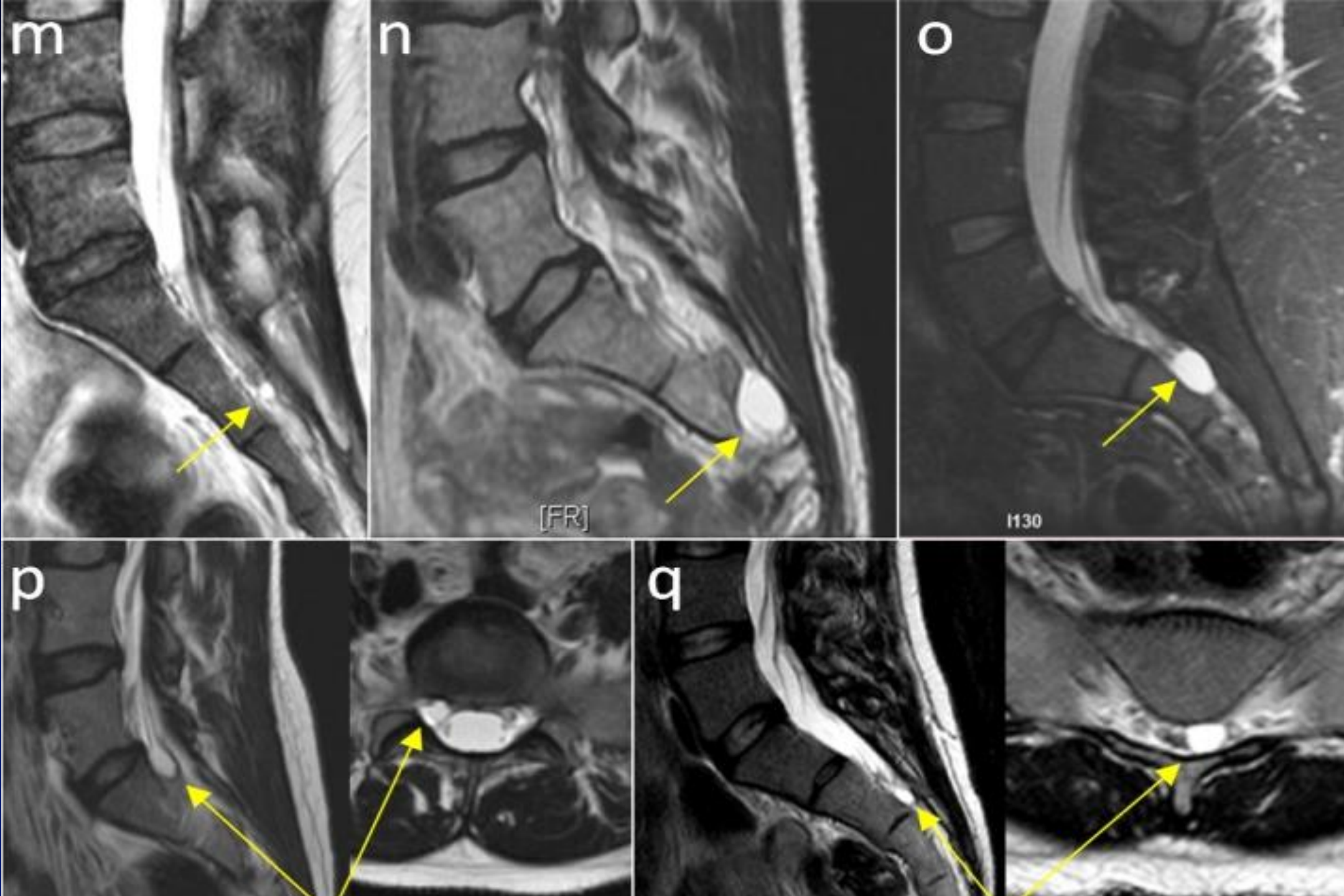
Dorsal root ganglion

Tarlov cysts



Sagittal


S
T2-weighted MRI image of L.A.'s Tarlov cyst at S2
Injection needle inserted into L.A.'s Tarlov cyst. Cyst is partially empty in this CT image with black air above and small fluid below. The same needle was used to inject fibrin glue inside the cyst for treatment.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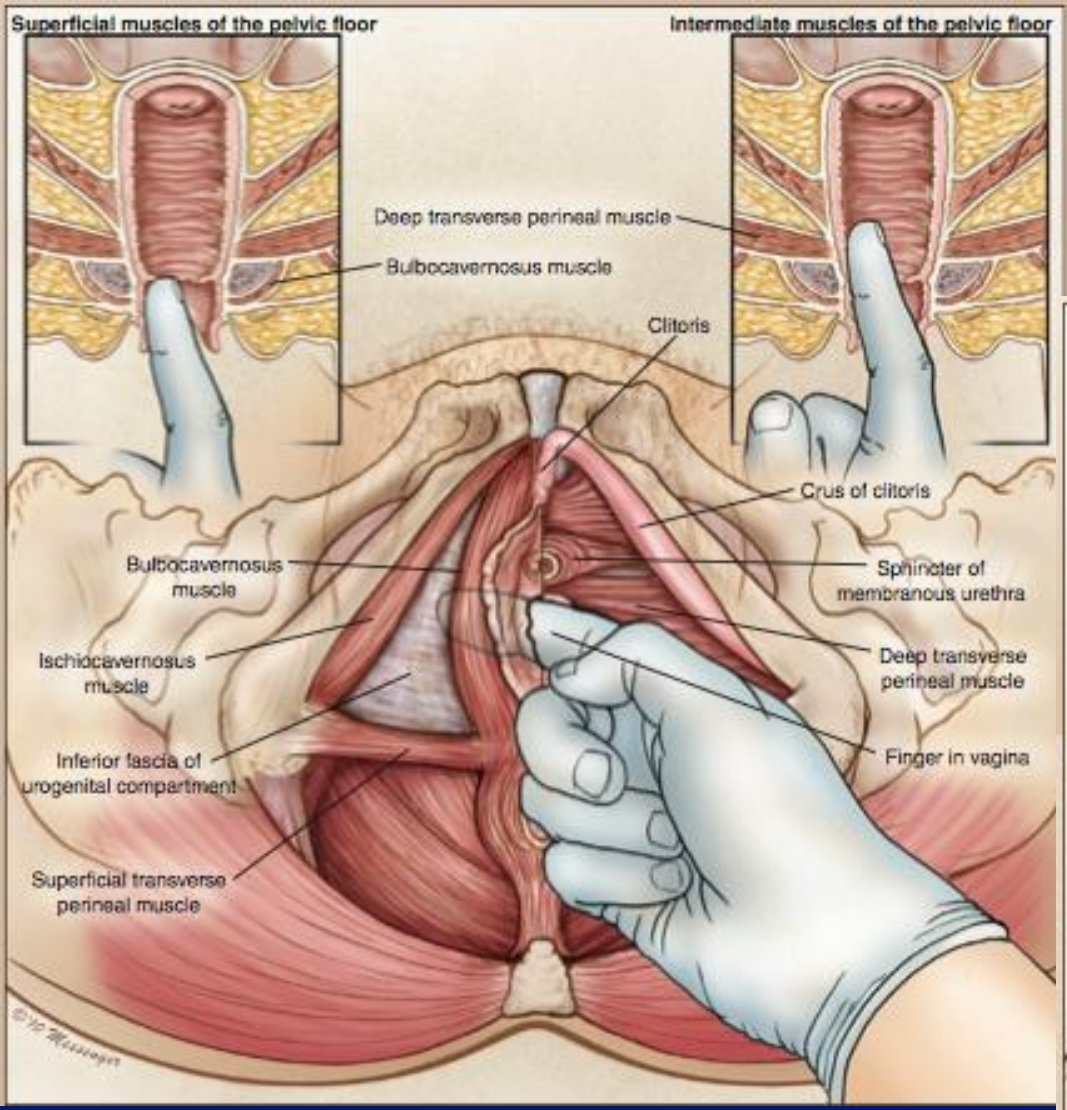
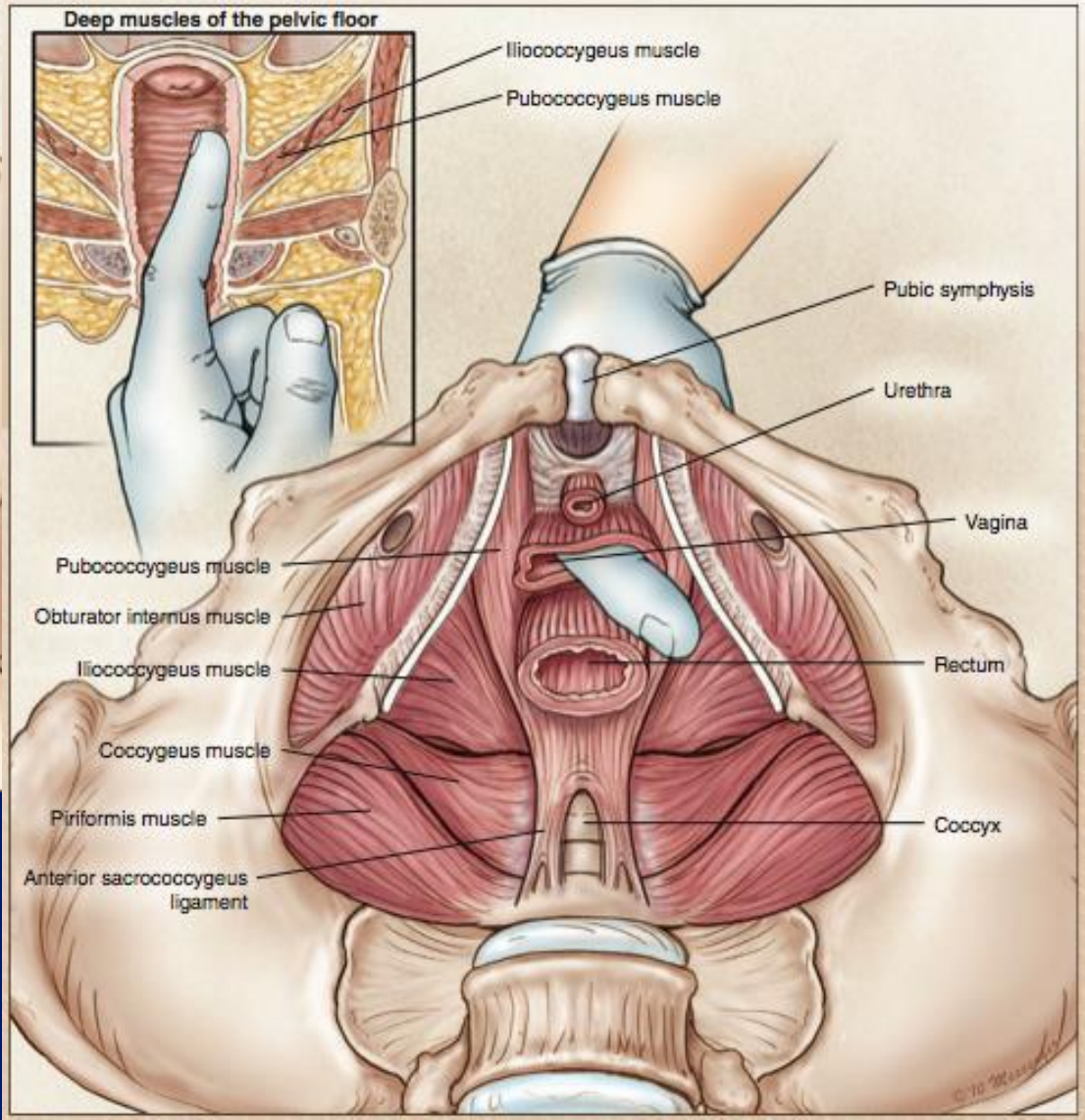
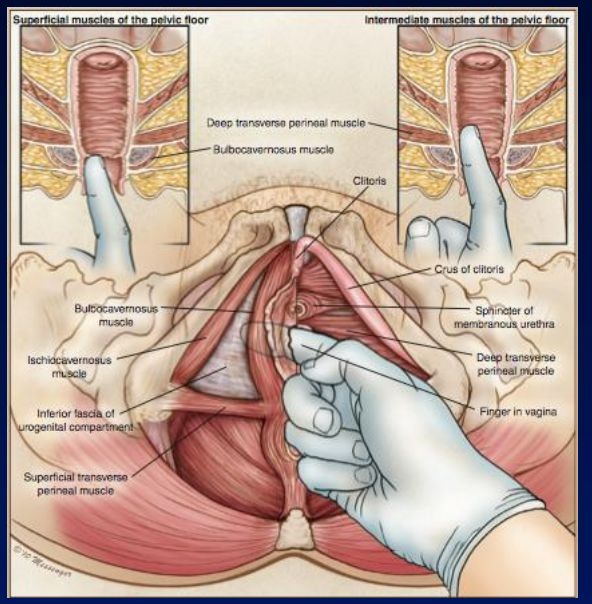
m) high tone pelvic floor dysfunction

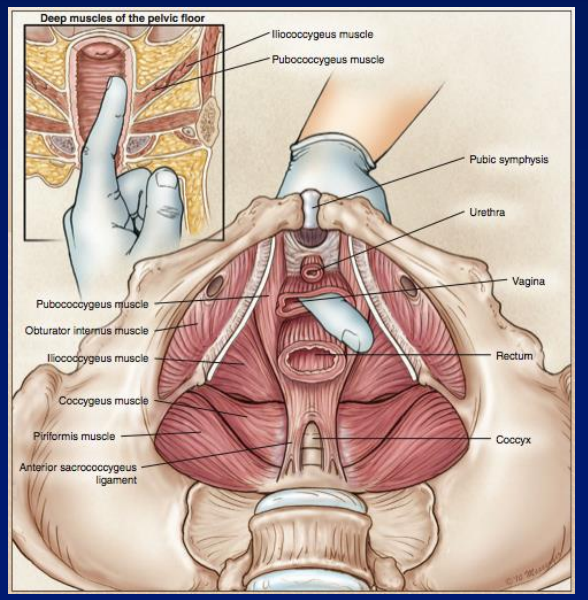

Superficial muscles of the pelvic floor
Intermediate muscles of the pelvic floor
Deep transverse perineal muscle
Bulbocavernosus muscle
Clitoris
Crus of clitoris
Bulbocavernosus muscle
Sphincter of membranous urethra
Ischiocavernosus muscle
Deep transverse perineal muscle
Finger in vagina
Inferior fascia of urogenital compartment
Superficial transverse perineal muscle


Deep muscles of the pelvic floor
Iliococcygeus muscle
Pubococcygeus muscle
Pubic symphysis
Urethra
Vagina
Pubococcygeus muscle
Obturator internus muscle
Iliococcygeus muscle
Rectum
Coccygeus muscle
Piriformis muscle
Coccyx
Anterior sacrococcygeus ligament

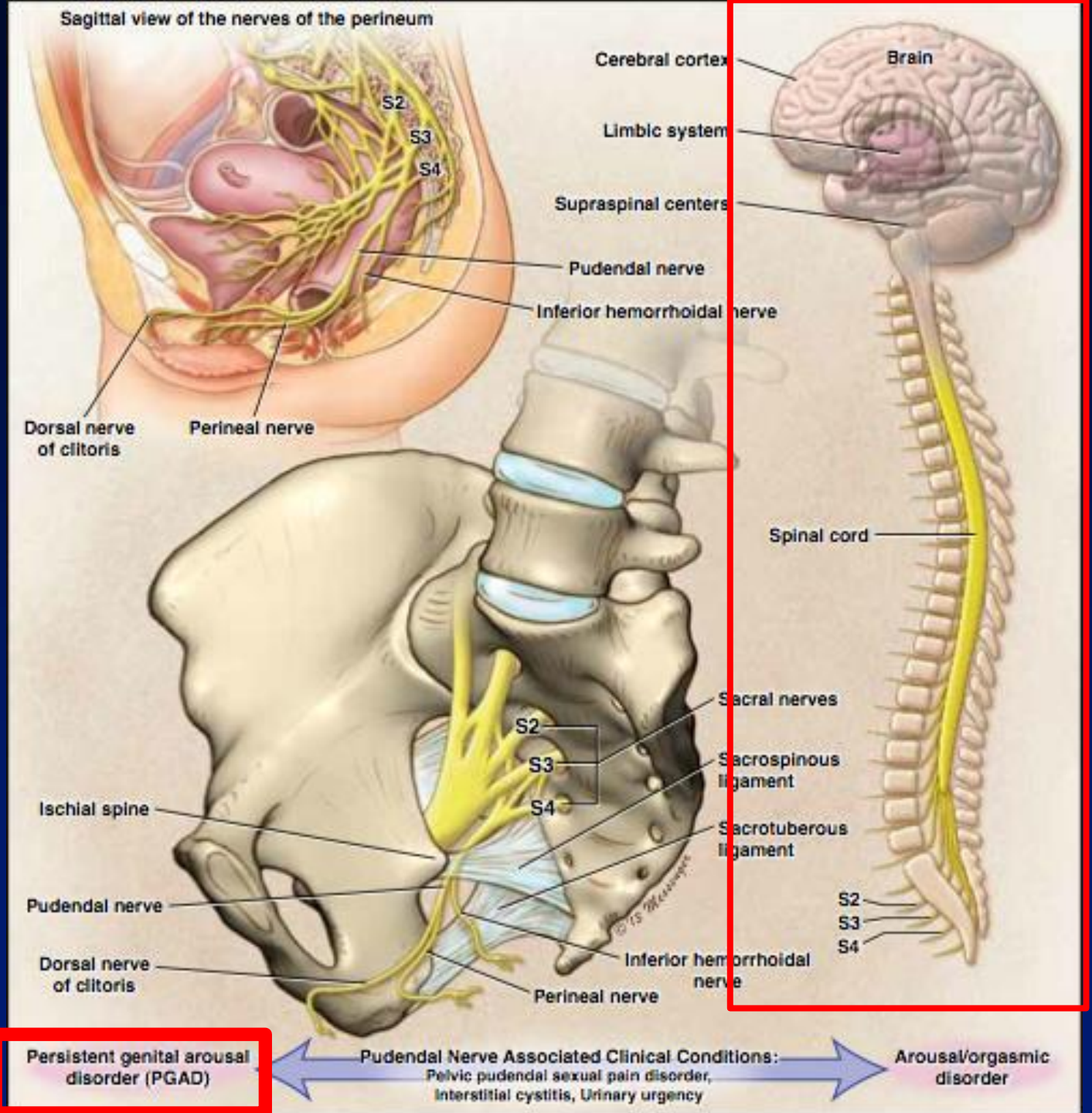
Hypertonic Pelvic Floor Muscle Dysfunction

- Increased tone causes a decrease in blood flow and oxygen to the muscles of the pelvic floor. This leads to a build up of lactic acid.
- Symptoms include: generalized vulvar pain or burning, tenderness where the muscle insert (4,6,8 o'clock on the vestibule) which causes severe introital dyspareunia, urinary symptoms (frequency, hesitancy, incomplete emptying) constipation, hemorrhoids, and rectal fissures
- Physical exam reveals erythema where the muscles insert at the vestibule, multiple trigger points, muscles weakness and an inability to hold a sustained contraction.





Increased peripheral pudendal nerve sensory afferent input



Central sexual arousal reflex center that is overly excited and under inhibited

High Excitation, Low Inhibition Sexual Dysfunction

SEX THERAPY

Strategies to reduce anxiety
Conservative measures such as heating pad, warm bath, yoga and acupuncture

PHYSICAL THERAPY

Pelvic floor relaxation strategies to reduce stress or anxiety that is associated with skeletal muscle pelvic floor relaxation

Pharmacologic Agents That Decrease Neurotransmission – (Local Anesthesia, Tricyclic Antidepressants, Calcium Channel Blocking Agents, Sodium Channel Blocking Agents, Anticonvulsant Agents)

Lidocaine – topical 1-5%
TCA – Amitriptyline – 25 – 150 mg
TCA – Nortriptyline – 25 – 100 mg
TCA – Desipramine – 25 – 300 mg
Ca+ - Gabapentin – 100 – 2400 mg
Ca+ - Pregabalin – 25 – 300 mg
Na+ - Carbemazepine – 100 – 400 mg
Na+ - Oxcarbazepine – 150 – 2400 mg
Lamotrigine – 25 – 200 mg

Non-Pharmacologic Strategies That Decrease Neurotransmission

TENS/Inferential Stimulation
Sacral Neuromodulation – Interstim
Pudendal Neuromodulation – Interstim
Pudendal Nerve Block – local anesthesia and steroid
Electroconvulsive Therapy (ECT)

EXCITATION – Central and Peripheral

- SEX STEROIDS, THYROID HORMONE
- DOPAMINE
- OXYTOCIN
- MELANOCORTIN
- NOREPINEPHRINE - STRESS, ANXIETY
- PUDENDAL NEUROPATHY/EXCEESS STIMULATION FROM TISSUE SERVED BY PUDENDAL NERVE

INHIBITION - Central and Peripheral

- SEROTONIN
- OPIOIDS
- ENDOCANNABINOIDS
- PROLACTIN

Bancroft J, et al. *J Sex Res.* 2009;46:121-142.

DOPAMINE ANTAGONIST

Varenicline Tartrate 0.5 mg – 2 mg/day

Hyperthyroidism

Methimazole 5 – 60 mg

Serotonin and Norepinephrine Reuptake Inhibitor
Serotonin Reuptake Inhibitor and 5 HT1A Receptor Partial Agonist

SNRI - Duloxetine - 20 – 120 mg
SNRI – Venlafaxine – 75 – 225 mg
SNRI – Desvenlafaxine – 50 – 100 mg
SRISRPA - Vilazodone – 10 – 40 mg

Opioid Agonist

Tramadol 25 – 200 mg
Tapentadol 25 – 400 mg
Hydrocodone bitartrate and acetominophen – 5/500
Oxycodone and Acetaminophen – 2.5/325 – 10/325

Cannabinoid

Dronabinol – 2.5 – 20 mg

Vascular Causes

Arterial Venous Malformation – Embolization
Congestion Syndrome - Embolization

Neurologic Causes

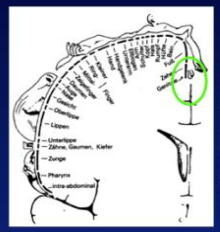
Cerebral space occupying lesion, CVA
Spinal Cord injury, trauma, surgery

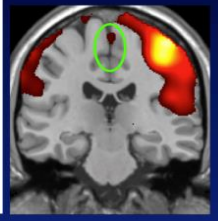
Pharmacologic Causes

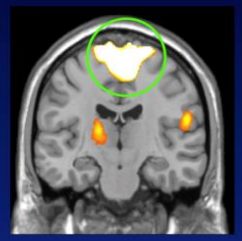
DISCONTINUE UNDER SUPERVISION:
Trazodone
Anti-psychotics - chlorpromazine
Anti-coagulants – heparin
Anti-hypertensives – alpha-blockers
Recreational drugs – cocaine

Severe 10/10 PGAD - Pulsating throbbing genital arousal sensations

Persistent Genital Arousal Disorder: during an attack



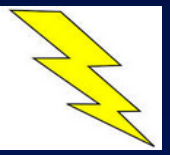


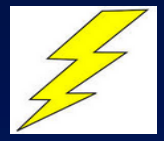


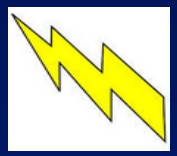
Homuncular genital representation

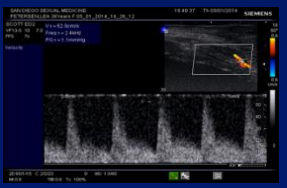
Normal clitoris projection

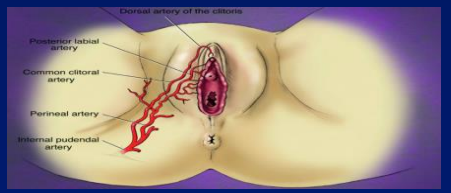
PGAD attack

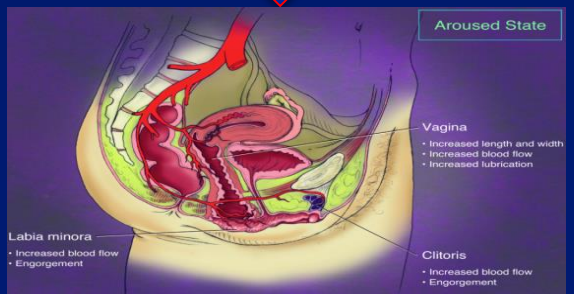


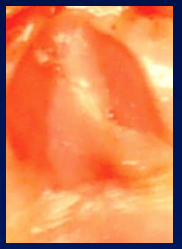


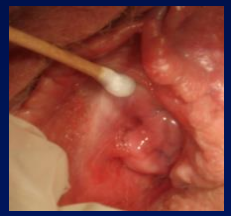


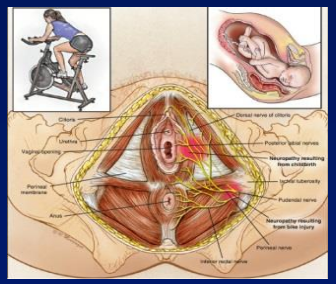


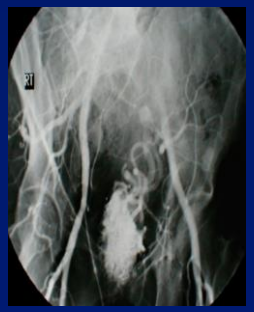


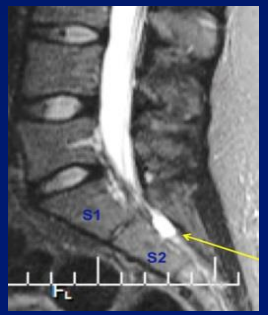


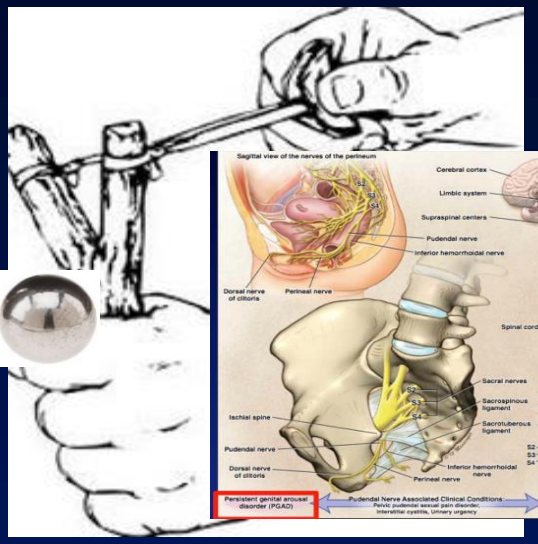












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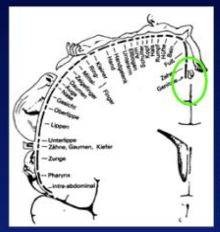
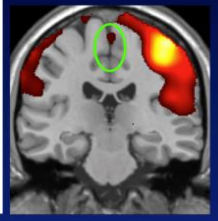
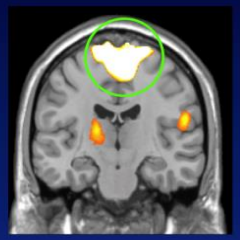
PGAD after Peripheral Treatment

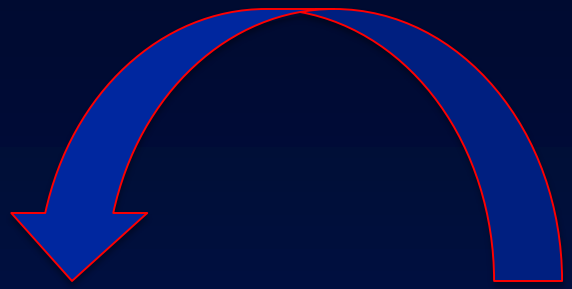
Persistent Genital Arousal Disorder: during an attack

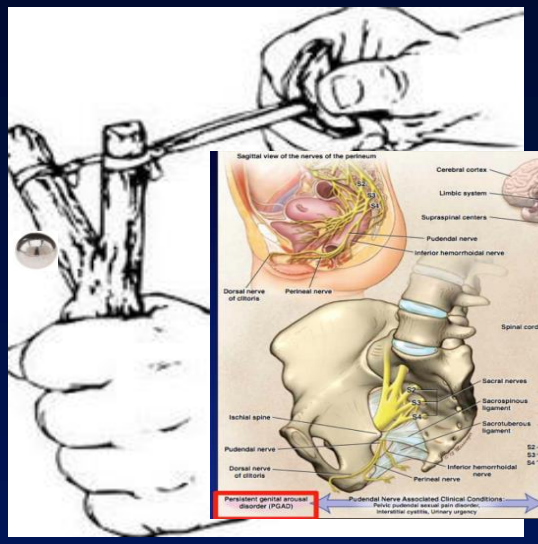


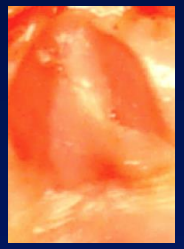


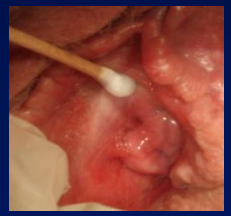


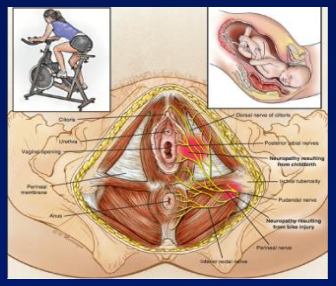
Homuncular genital representation | Normal clitoris projection | PGAD attack

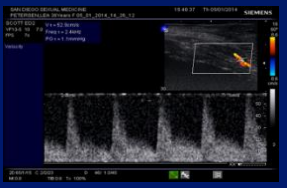


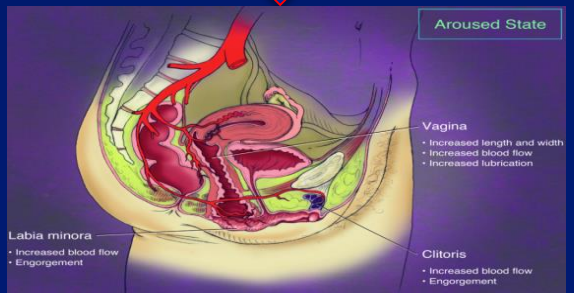


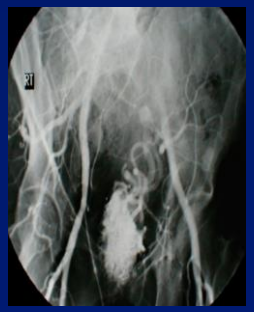


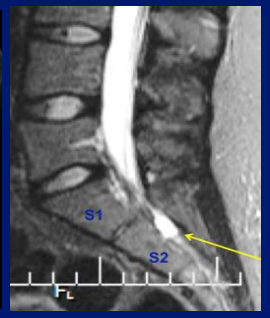












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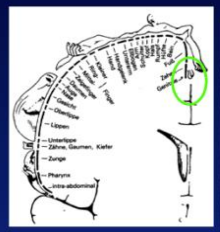
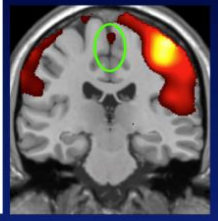
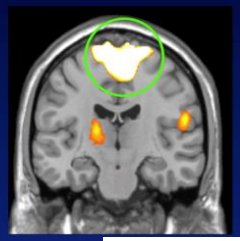
PGAD after Peripheral and Central Treatment

Persistent Genital Arousal Disorder: during an attack



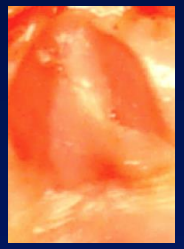


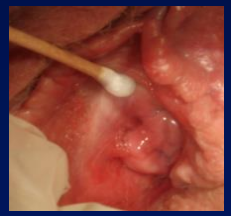


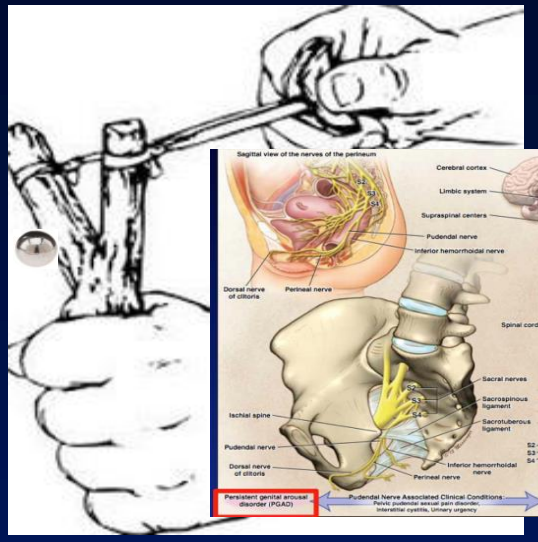
Homuncular genital representation

Normal clitoris projection

PGAD







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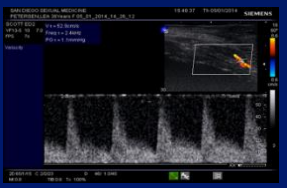

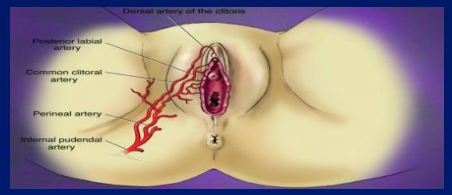

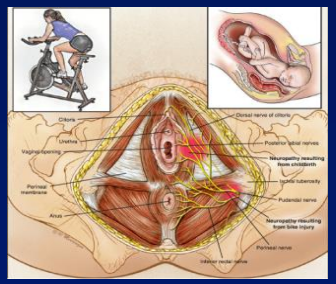

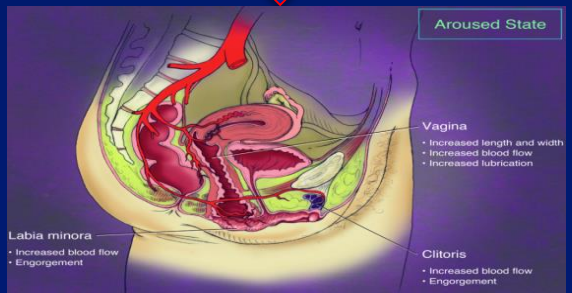

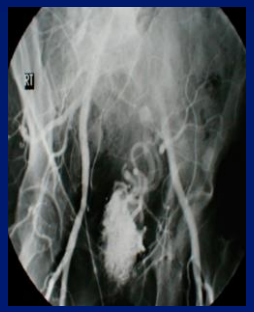

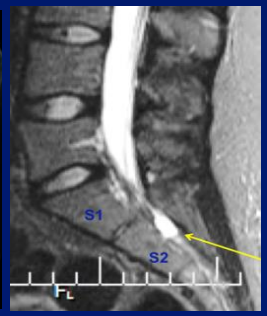

Persistent Genital Arousal Disorder (PGAD)

Effective treatment of PGAD consists of attention to both the peripheral problems and the central problems

PGAD is a dynamic condition - there will be times where the persistent genital arousal symptoms are worse

Hopefully with logical, rational biopsychosocial treatments, the persistent genital arousal symptoms will be more often better