

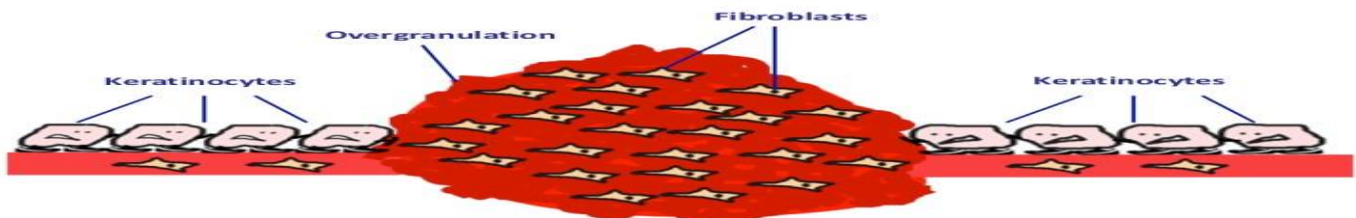
HYPERGRANULATION AFTER PENILE INVERSION VAGINOPLASTY

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Hypergranulation tissue (aka overgranulation) is an excess of granulation tissue that rises above the surface of the wound bed. It is a condition in which fibroblast and new capillary growth is excessive, resulting in a raised appearance above the wound margins.

What is the cause of hypergranulation?

It is a result of prolonged stimulation of fibroplasia and angiogenesis which in turn prevents epithelialization. This is an aberrant response causing an overgrowth of fibroblasts and endothelial cells. It is more likely to occur in wounds healing by secondary intention. Multiple factors increase the chances for overgrowth of granulation tissue including: moisture, repetitive trauma, irritation/friction, excessive inflammation, bacterial bioburden, low O₂. Unfortunately, these are all relevant risk factors in the context of post-operative vaginoplasty. Despite it being more common in the early postoperative period, it can occur at any time.



What does it look like?

Hypergranulation has a spongy, shiny, bright/beefy red appearance, often grainy in texture that extends above the surface of the surrounding skin. It is sometimes compared to the appearance of the surface of a raspberry. It can be either flat (i.e. patch, linear) or can form a polyp-like projection (i.e. a fleshy red flap of tissue). It is typically friable, bleeding easily, and can sometimes be painful. Hypergranulation can present in many different locations to the vulva/vagina but more frequent locations include the posterior forchette/aspect of introitus, especially if wound

separation had occurred here; the vulvar anatomy created with urethral mucosal tissue (i.e. the vestibule, clitoral hood, urethral meatus) and inside the vaginal cavity at the apex. Frequent symptoms accompanying intravaginal hypergranulation include vaginal bleeding, blood on the dilators, and increased discomfort with dilation.

Do we need to treat hypergranulation?

Untreated hypergranulation can delay wound healing by inhibiting the migration of the epithelial cells, produce bothersome symptoms and can be susceptible to secondary infections due to the lack of the epithelial barrier and typically warrants treatment. It can also be in places that interfere with urination or dilation and therefore is a risk for serious complications if left untreated. In addition, it can create unfavorable symptoms such as pain, bleeding, and vaginal discharge that can have a negative impact on the patient.

What is the treatment for hypergranulation?

There is currently poor evidence around treatment and prevention of hypergranulation tissue in general, even less in vaginoplasty. The principles of what we know about its etiology as well as expert opinion is used as guidance for treatment. This being to minimize moisture, discharge, friction or repetitive trauma, bacterial bioburden and low O2.

Treatments are grouped into topical and procedural

Topical treatments

- Bethamethasone Valerate 0.1% or Triamcinolone 0.1% (low to mid potency steroids Steroid/antibiotic)
- Viaderm ointment (Triamcinolone actinide 1mg/Nystatin 100,000 units/Neomycin 2.5mg/Gramicidin 0.25mg)
- Antibacterial honey (Medihoney)
- You can apply topical treatments directly to the tissue or if it is internal, medication can be applied to dilators and inserted into the vagina or a vaginal applicator can be used. Frequency can be as often as once/twice daily, as little as every 2-3 days (recommendations vary) for 1-4 weeks or until resolution

Procedural:

- Silver nitrate, typically considered the gold standard of treatment (see below for instructions)
- Cautery or surgical excision/sharp debridement
 - This strategy is invasive and requires local or general anesthesia and so should be reserved for large, resistant or obstructive pedunculated tissue that can be dealt with in this manner.

Silver Nitrate is the most widely accepted and used treatment for hypergranulation based on its effectiveness and ease of use. It is available as a caustic 'pencil' which is an applicator stick where the tip contains 95% silver nitrate which is fused with 5% potassium nitrate. Silver nitrate works by acting as a strong oxidizing agent. In aqueous solution, the silver cation of this salt, Ag(I), is readily reduced to neutral silver metal, Ag (O), resulting in the release of free radicals. The chemical stress that accompanies this reaction will oxidize organic matter, coagulate tissue and destroy bacteria. The cauterization to the hypergranulated surface will necrose the superficial granulation tissue.

Application:

Rub and rotate the tip of the applicator along the hypergranulation tissue. Local anaesthetic is not typically required. Two minutes or less of contact time is typically enough. Apply until cautery is observed with resultant grey covering and coagulation. Depending on the size of the area to be debrided, more than one applicator stick may be needed.

For internal application, the use of a speculum or an anoscope is likely required. Leave the speculum/anoscope in place for one – two minutes after treatment to ensure absorption of the silver nitrate and to decrease risk of spread to surrounding tissues.

Frequency of applications would ideally be 2-3x/week. Due to clinic limitations, once weekly is reasonable for 4-6 weeks or until resolution. If no improvement by 6 weeks, consider a referral back to the primary surgeon for assessment or to the TRS program at Women's College Hospital.

Prevention

- **Wound healing**
 - Keep any wounds or open areas as dry as possible, open to air and remove exudate or discharge over the area
- **Douching**
 - This is typically done to rinse of the vaginal cavity. The neovagina contains keratinized epithelium and does not self-clean. Douching can rinse out bacteria and discharge from the neovagina that can interfere with wound healing as well as minimize vaginal build up of lube, semen, sebum, or dead-skin slough. Every surgical center has a different recommendation around douching, but after one year typical recommendations are 1-2x/week. If a patient is prone to hypergranulation more frequent douching or changing the douching solution to a more hypertonic solution can be helpful
 - Options:
 - Use an effective douche that acts as a pump and can get to the apex of the vagina (such as the one depicted here)
 - Increase douching **frequency**
 - Increase the **hypertonicity** of the douching solution
 - Utilize a rinse with anti-microbial properties



Water	Hypotonic
Saline	Isotonic
25% Providine iodine (Betadine)	Isotonic/Antimicrobial
White vinegar	Hypertonic
Soap	Hypertonic