

### Editor's key points

- ▶ Patients undergoing gender-affirming vaginoplasty frequently seek care from family physicians, the latter playing an important role in recognizing and managing complications.
- ▶ Hypergranulation is one of the most common complications of vaginoplasty that family physicians encounter; as such, guidance on how to manage hypergranulation in primary care settings is needed.
- ▶ Hypergranulation is common in the first year after vaginoplasty and is often associated with bleeding. It has a smooth red cobblestone appearance and can be managed with a combination of hygiene recommendations, topical steroids, and silver nitrate.

# Hypergranulation management following penile inversion vaginoplasty

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## Abstract

**Objective** To summarize current knowledge regarding management of hypergranulation in the context of gender-affirming vaginoplasty.

**Sources of information** There have been no studies to date examining hypergranulation treatment options following vaginoplasty. Evidence from the literature on this complication in other settings and the opinions of authorities and experts in this area were used to inform this review.

**Main message** Hypergranulation is a common complication of vaginoplasty, but many care providers may not know how to identify or treat it. This short report will review hypergranulation after vaginoplasty, including risk factors, identification, and treatment options such as douching, silver nitrate, and topical steroids.

**Conclusion** By increasing clinicians' knowledge of this pervasive complication, patients' postsurgical care and outcomes can be improved.

# Prise en charge de l'hypergranulation consécutive à une vaginoplastie d'inversion pénienne

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## Résumé

**Objectif** Résumer les connaissances actuelles sur la prise en charge de l'hypergranulation dans le contexte d'une vaginoplastie d'affirmation de genre.

**Sources de l'information** Aucune étude n'a examiné jusqu'à présent les options de traitement de l'hypergranulation consécutive à une vaginoplastie. Les données probantes issues de la littérature sur cette complication dans d'autres contextes, et l'avis d'autorités et d'experts du domaine ont servi à éclairer les lignes directrices présentées dans cette revue.

**Message principal** L'hypergranulation est une complication fréquente de la vaginoplastie, mais beaucoup de fournisseurs de soins peuvent ne pas savoir comment la détecter ou la traiter. Ce bref rapport examine l'hypergranulation consécutive à la vaginoplastie, y compris les facteurs de risque, sa détection et les options de traitement, comme la douche vaginale, le nitrate d'argent et les stéroïdes topiques.

**Conclusion** En augmentant les connaissances des cliniciens sur cette complication répandue, on peut améliorer les soins postopératoires et les résultats des patientes.

## Points de repère du rédacteur

► Les personnes qui ont subi une vaginoplastie d'affirmation de genre cherchent souvent à se faire soigner par des médecins de famille, qui jouent un rôle de premier plan dans la reconnaissance et la prise en charge des complications.

► L'hypergranulation est l'une des complications les plus fréquentes de la vaginoplastie auxquelles les médecins de famille feront face. Des lignes directrices sur sa prise en charge dans un milieu de soins de première ligne sont donc nécessaires.

► Fréquente au cours de l'année suivant une vaginoplastie, l'hypergranulation est souvent associée à un saignement. Elle a un aspect rouge et lisse qui s'apparente à celui d'un pavé. On peut la prendre en charge en alliant des recommandations d'hygiène à des stéroïdes topiques et à du nitrate d'argent.

**M**any transgender and gender-diverse individuals who are assigned male at birth undergo penile inversion vaginoplasty to create vulvar anatomy and a vaginal canal using penile and scrotal skin.<sup>1</sup> This surgery has low rates of major complications but the frequency and consequences of minor nonsurgical complications may not be captured well in the literature.<sup>2-4</sup> Of the minor complications affecting patients following vaginoplasty, hypergranulation tissue is relatively common and underappreciated.<sup>5-8</sup> Considering most Canadians have vaginoplasty outside their home province,<sup>9</sup> patients report difficulties in communicating complications to their surgical team and arranging in-person follow-up appointments, which can negatively impact their recovery.<sup>10</sup> Access to local health care providers knowledgeable in transgender health is crucial for positive postsurgical outcomes. Hypergranulation can be distressing and may lead to poor results, which is why it requires prompt attention and regular in-person follow-up. Family physicians, who are equipped to identify and treat this complication, play a key role in providing accessible and effective care. Information regarding hypergranulation management is presented below to support family physicians caring for patients undergoing gender-affirming vaginoplasty.

### Case description

Jen is a 38-year-old transgender woman who underwent vaginoplasty 4 months ago. She presents to you with a complaint of bleeding and a “bump” above her clitoris. Upon inspection, you notice that she has a flap of hypergranulation above her clitoris (**Figure 1**). How would you manage this?

### Sources of information

Currently, there are no published evidence-based guidelines for the treatment of hypergranulation in the context of postvaginoplasty care. Treatment varies widely from provider to provider and includes many courses of action, including conservative therapy, silver nitrate, curettage, electrocautery, direct excision, mild- to moderate-potency steroids, and antibiotics. In this review article, clinical practice conducted at Women’s College Hospital in Toronto, Ont, is highlighted. The level of evidence for recommendations is graded as level III as they are based on expert opinion.

### Main message

Hypergranulation tissue is a common complication of penile inversion vaginoplasty<sup>5-8</sup>; however, the symptoms, impact, and management of hypergranulation are not well defined in the literature. A review of vaginoplasty outcomes reported hypergranulation tissue in 7% to 26% of patients.<sup>5</sup> However, the incidence of hypergranulation tissue may be underreported as postoperative care is often sought outside the surgical centres that collect and

report these data. In a recent study examining patients seen for postoperative follow-up care after vaginoplasty, 38.8% were found to have hypergranulation.<sup>6</sup>

Granulation tissue is a critical step for wound healing by secondary intention. Hypergranulation, or overgranulation, is the overgrowth of granulation tissue and is a maladaptive healing response. It is thought to be a result of prolonged stimulation of fibroplasia and angiogenesis, thereby preventing epithelialization.<sup>11</sup> Hypergranulation is unique in its cobblestone-like appearance, extension beyond and above the surrounding skin, red or purple colour, and how easily it can bleed (**Figure 1**). It can present in various forms such as a flat shelf or a projection of tissue that protrudes outward. An overgrowth of granulation tissue that rises above the surface of the wound bed may have other important impacts on the patient and surgical outcome, such as pain, bleeding, discharge, impeding vaginal dilations, and loss of vaginal dimensions.

The cause of hypergranulation in the context of vaginoplasty has not been well described. Multiple factors have been shown to increase the incidence of hypergranulation in other contexts, including moisture, repetitive trauma, irritation and friction, excessive inflammation, bacterial bioburden, and low oxygen exposure.<sup>11,12</sup> Vaginoplasty is a unique surgery in which all these risk factors are present. The vagina and labia can retain moisture, especially in patients with larger labia, which can prevent the introitus, including the posterior fourchette, from staying dry. Additionally, patients must perform regular dilation of the vaginal canal, particularly in the initial months following surgery, with a high frequency, typically 3 to 4 times per day. Frequent dilation can cause repetitive trauma, irritation, and friction. Inflammation is an important phase of the adaptive healing response after surgery.<sup>13</sup> The genital skin and neovagina contain a substantial bacterial bioburden.<sup>14</sup> Oxygen exposure is minimal inside the vaginal canal. Certain risk factors have been associated with

**Figure 1. Hypergranulation following penile inversion vaginoplasty**



the occurrence of hypergranulation, including diabetes, hypertension, and high body mass index.<sup>15</sup> These risk factors, along with others not yet identified in a vaginoplasty context, can increase the likelihood of hypergranulation and may impact treatment efficacy.

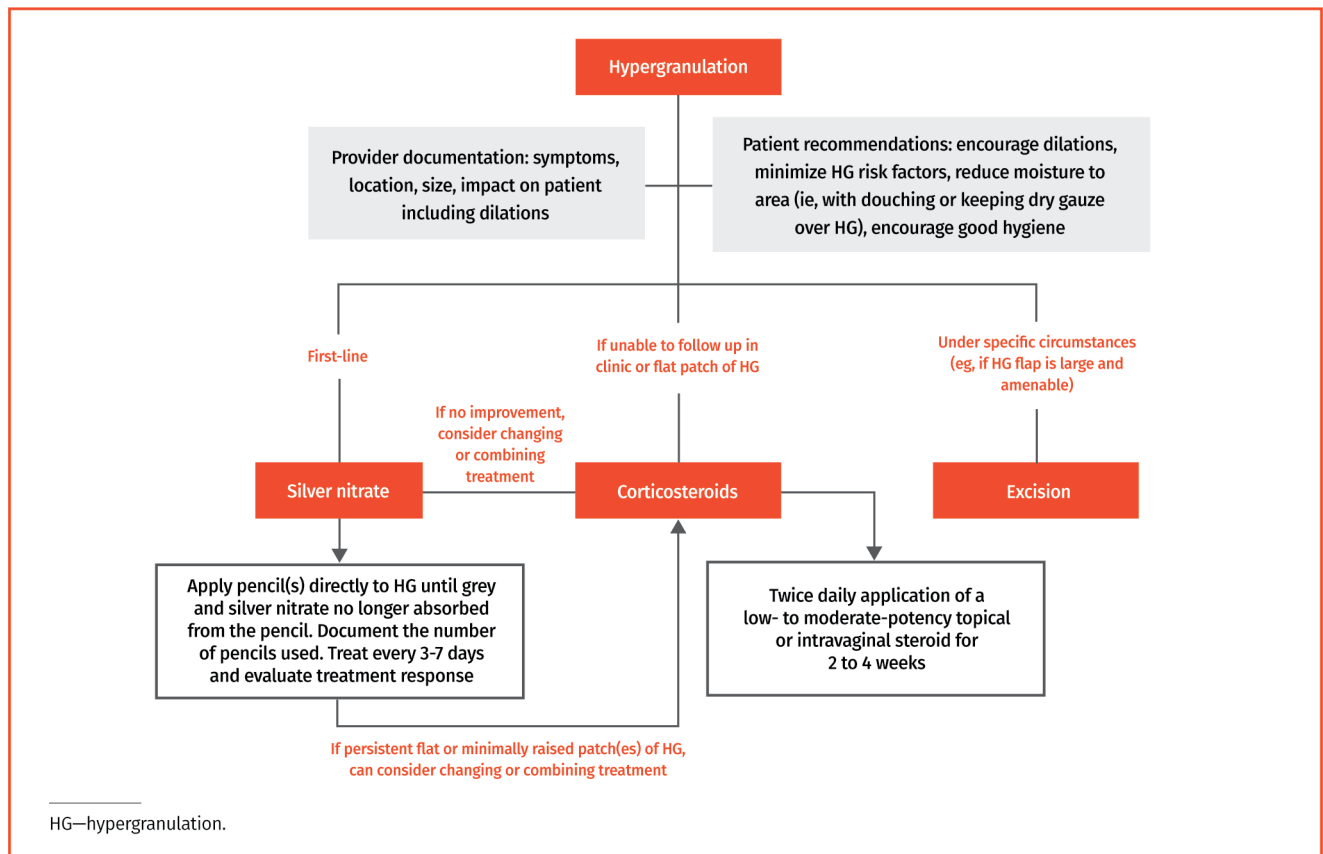
Symptoms of hypergranulation can be distressing for patients as it can cause bleeding, delayed wound healing, and pain, and can make dilation more difficult.<sup>3,5</sup> It is crucial that patients continue to dilate despite the presence of hypergranulation to maintain vaginal depth. Failure to dilate can result in loss of vaginal depth or vaginal stenosis requiring major revision surgery; untreated hypergranulation tissue can create a mass effect and take up space within the vaginal cavity.<sup>7,16</sup> In our experience, it is best to initiate treatment when hypergranulation is first identified to minimize complications.

**Treatment of hypergranulation.** Our practice involves a multipronged approach (**Figure 2**). We begin by addressing the moist environment that promotes hypergranulation. For external hypergranulation, commonly presenting at the posterior fourchette or vestibule, patients are encouraged to keep the area as dry as possible. This can be achieved by keeping the affected area open to air or by placing a dry gauze between the labia and over the area of hypergranulation and changing it when saturated. Some surgical centres recommend

performing regular sitz baths, which may be disadvantageous in the context of hypergranulation. Different surgical sites have different recommendations regarding routine postoperative care, including whether or not to douche and which douche solution to use. In the context of intravaginal hypergranulation, douching likely provides benefits by pulling moisture and fluid out; therefore, regular douching is recommended. Douching may also rinse out residual lube from dilation that may be retained inside the vault and slowly leak out, contributing to a moist external environment and increased risk of hypergranulation. The type of douching solution, douche bottle, volume of solution, and frequency of douching are important. The tonicity of the douche solution is a major consideration (**Table 1**). While a hypotonic solution may promote moisture, a hypertonic solution should have a drying effect. For this reason, hypertonic douche solutions such as a saltwater solution, soapy water, or a 50:50 solution of white vinegar and water are recommended. The type of douche bottle may impact the efficacy of the douche solution and our clinic recommends a bottle with a long tip, a pump for irrigation, and a reservoir that holds more than 250 mL. The ideal frequency of douching is once daily at minimum, or as frequent as dilations occur.

Treatment of hypergranulation postvaginoplasty with silver nitrate has been recommended as first-line

**Figure 2.** Hypergranulation management algorithm



**Table 1. Douching solutions**

SOLUTION	TONICITY
Water	Hypotonic
Saline	Isotonic
25% povidone-iodine	Isotonic
Saltwater solution (saline + salt)	Hypertonic
White vinegar solution (50:50 water and white vinegar)	Hypertonic
Soap and water	Hypertonic

treatment.<sup>7,17,18</sup> Silver nitrate is a widely accepted and used treatment for hypergranulation in nonvaginoplasty wound healing based on its effectiveness and ease of use.<sup>11,12,19,20</sup> It is available as a caustic “pencil,” which is an applicator stick where the tip contains 95% silver nitrate fused with 5% potassium nitrate. The efficacy of silver nitrate is due to its action as a strong oxidizing agent.<sup>21,22</sup> The chemical stress that accompanies the reaction when silver nitrate is exposed to an aqueous solution will oxidize organic matter, coagulate tissue, and destroy bacteria. The free silver ions released bind to tissue, obstructing vessels and forming a grey eschar. The eschar will slough off after a few days leaving behind the remaining hypergranulation or granulation tissue.

When performing pelvic examinations and assessing for hypergranulation, a trauma-informed and patient-centred approach as described by Grimstad et al should be undertaken.<sup>18</sup> This includes an ongoing process of consent throughout both patient examination and treatment. There is variability in the step-by-step instructions on the application of silver nitrate.<sup>23,24</sup> The first step is to activate the silver nitrate with deionized or distilled water.<sup>25</sup> The necessity of this step is unclear, with many providers applying the dry pencil directly to the hypergranulation tissue. Due to the excess fluid retained in hypergranulation, silver nitrate becomes active when the tip of the pencil touches the tissue. Once silver nitrate is applied to the hypergranulation, the reaction is almost immediate, visualized by the red fleshy tissue turning grey. Due to the degradation of epithelium on the hypergranulation, silver nitrate is readily absorbed by the tissue. Despite variability in instructions, one commonality is to apply the silver nitrate until the grey discoloration is seen, at which point the hypergranulation no longer absorbs the silver nitrate from the pencil. This may require multiple pencils and will depend on the extent of the hypergranulation.

Occasionally, the application of silver nitrate to the hypergranulation tissue will cause discharge and bleeding. Any excess silver nitrate not absorbed into the hypergranulation tissue could come in contact with healthy skin. Caution should be taken to wipe away any excess discharge, which is usually in the form of a thin grey liquid. Care manuals have recommended applying

a barrier cream or ointment around the treatment area, dabbing a dry gauze to soak up any additional chemical not absorbed into the tissues, or applying a saline-soaked gauze to the treated area.<sup>20,23,24</sup> Putting a dressing over the treated area is not routinely recommended and is often not feasible due to the location.

Hypergranulation typically requires multiple treatments of silver nitrate application. Treating patients for several months for this complication is not unusual. The duration of treatment and number of treatments needed are typically determined by the extent of tissue involvement. Additionally, it may be influenced by aspects such as potential risk factors for hypergranulation. Usual management at our institution involves treatment once per week. It is possible patients may benefit from more frequent visits (ie, twice per week), but our practice is limited to only once per week. When treating hypergranulation, it is important to document patient symptoms and impact, location and size, number of silver nitrate pencils used, and response to treatment.

For refractory hypergranulation, or if patients are unable to come into the clinic regularly, a course of low- to moderate-potency topical steroid (ie, 1% hydrocortisone, 0.1% triamcinolone) applied by the patient twice daily for 2 to 4 weeks may be considered. For hypergranulation inside the vault, using a vaginal applicator is recommended over using a dilator as this may cause the steroid to be pushed out. In our practice, we try to limit steroid use to patients whose hypergranulation is presenting as a flat patch rather than substantial projections. The steroids encourage epithelialization of the tissue but may not induce destruction of the tissue. This may result in projections of epithelialized tissue that can create an irregular surface on the vaginal canal and limit vaginal dimensions. Newer studies on hypergranulation have noted a benefit from the use of topical steroids when compared with silver nitrate.<sup>26</sup> There are little data on the use of steroids for hypergranulation treatment in postvaginoplasty patients, so caution must be taken when interpreting data for this context. Direct excision of the tissue is also considered at our centre when there is a substantial projection of tissue that can be easily excised. This presents a more aggressive approach to management with increased risk of pain, bleeding, and infection, but may be preferred by some patients to minimize treatment duration.

### Case resolution

You discuss the diagnosis of hypergranulation with Jen and review the treatment options available. Silver nitrate is chosen and 2 pencils are applied to the hypergranulation. After 3 weeks of weekly applications of silver nitrate, the hypergranulation fully resolves.

### Conclusion

Hypergranulation is a common postoperative complication following penile inversion vaginoplasty that can

have a negative impact on the patient and their surgical outcome. Appropriate evaluation and management are critical. Increasing access to care for this population is essential and primary care providers are well-suited to manage this complication. This paper reviewed the current literature on hypergranulation and presented a clinic's approach to management. More research is needed to better understand risk factors for occurrence and the impact of delayed treatment response, management strategies, and hypergranulation in general on both patients and their surgical outcomes. 🌿

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#### Contributors

All authors contributed to conducting the literature review and to preparing the manuscript for submission.

#### Competing interests

None declared

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