

OPEN

Author's Accepted Manuscript

A New Modified Bipedicle Scrotal Skin Flap Technique for the Reconstruction of Penile Skin in Patients with Paraffin-Induced Sclerosing Lipogranuloma of the Penis

Murányi M, Varga D, Kiss Z, Flaskó T

DOI: [10.1097/JU.0000000000002480](https://doi.org/10.1097/JU.0000000000002480)

Reference: JU-21-2032

To appear in: *The Journal of Urology*

Accepted Date: 3 Feb 2022

Please cite this article as: Murányi M, Varga D, Kiss Z, Flaskó T, A New Modified Bipedicle Scrotal Skin Flap Technique for the Reconstruction of Penile Skin in Patients with Paraffin-Induced Sclerosing Lipogranuloma of the Penis, *The Journal of Urology*® (2022), doi: [10.1097/JU.0000000000002480](https://doi.org/10.1097/JU.0000000000002480).

DISCLAIMER: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our subscribers we are providing this early version of the article. The paper will be copy edited and typeset, and proof will be reviewed before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to The Journal pertain.

**A New Modified Bipedicle Scrotal Skin Flap Technique for the Reconstruction of Penile Skin
in Patients with Paraffin-Induced Sclerosing Lipogranuloma of the Penis**

Authors: Mihály Murányi^{1*}, Dániel Varga¹, Zoltán Kiss¹, Tibor Flaskó¹

¹Department of Urology, University of Debrecen Faculty of Medicine
Nagyterdei krt. 98.
4032 Debrecen
Hungary

Email:

Murányi M (* corresponding author): muranyi.mihaly@med.unideb.hu

Varga D: dr.varga.daniel@med.unideb.hu

Kiss Z: kiss.jozsef.zoltan@med.unideb.hu

Flaskó T: flash@med.unideb.hu

Running head: Penile skin reconstruction to treat penile lipogranuloma

Keywords: penis, sclerosing lipogranuloma, paraffinoma, penile reconstruction, scrotal flap

Manuscript word count: 2498

© 2022 The Author(s). Published on behalf of the American Urological Association Education and Research, Inc. This is an open access article distributed under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivatives License 4.0 \(CC BY-NC-ND\)](#), which permits downloading and sharing the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

Abstract

Purpose

We introduce a new modified penile skin reconstruction technique to treat paraffin-induced sclerosing lipogranuloma of the penis.

Materials and Methods

From 2017 to 2020, 49 patients underwent the procedure. Complete removal of the lipogranuloma-involved penile skin was performed. A subcutaneous tunnel was then created between a horizontal scrotal incision and a proximal penile circumferential incision. The denuded penis was pulled through the tunnel, and a subcoronal and longitudinal dorsal penile suture line was made. An inverted V-shaped incision was made on the scrotum on the ventral side of the penis, followed by longitudinal closure. Outcomes and complications of the procedure were retrospectively studied. The long-term effect of surgery on sexual function and overall satisfaction was measured using a patient-reported questionnaire, which was completed by 30 patients.

Results

The overall complication rate was 26.5%. Clavien-Dindo grade 1, 2, 3a, 3b, 4, and 5 complications occurred in the postoperative period 5, 0, 8, 1, 0, and 0 times, respectively, in 13 patients. Surgery was successful in 27 (90%) patients, according to the patient-reported questionnaire. Erectile dysfunction, pain/tension during erection, premature ejaculation, and penile lymphoedema were observed in 2, 3, 1, and 1 patients, respectively. All patients reported sexual intercourse ability.

Conclusions

The type of penile skin reconstruction after the removal of sclerosing lipogranuloma of the penis is controversial. The reconstruction technique presented herein is an effective single-stage treatment option with a high success rate in patients with sclerosing lipogranuloma of the penis with intact scrotal skin.

Introduction

Sclerosing lipogranuloma of the penis (SLP) is a granulomatous foreign body reaction caused by subcutaneous injection of paraffin or other liquid fatty materials.¹ As a medical procedure, Robert Gersuny was the first to employ liquid paraffin injection into the genitals to replace testicles after bilateral orchiectomy in 1899.² Following promising initial results, paraffin injections have been applied in other medical fields; however, after the reports of late adverse complications, they have been abandoned in medicine. Notwithstanding, there has been a persistent use of subcutaneous paraffin injection by non-medical personnel as a procedure for penile girth enhancement. This is most frequently practiced in Southeast Asia and Eastern Europe. According to a recent review, the third most common cases are reported in Hungary; thus, the consequences of SLP are an emerging problem in our country.³

In our department, initial patients with SLP were treated with a two-stage penile skin reconstruction technique propagated by Kelemen Zs. et al. in Hungary.⁴ This technique is known as Cecil-type penile scrotal implantation in English literature.⁵ This was followed by the application of the one-stage bilateral scrotal flap technique reported by Shin et al.⁶ Subsequently, we modified this technique through our experience with the two-stage method. We aimed to develop an easily reproducible standardized one-stage penile skin reconstruction technique, resulting in high success and low complication rates.

Herein, we report on the technique and outcomes of our modified penile skin reconstruction procedure with a bipedicle scrotal skin flap for paraffin-induced SLP.

Materials and Methods

Patients

From September 2017 to March 2020, 49 patients underwent modified one-stage bilateral scrotal skin flap reconstruction to treat SLP. All surgeries were performed by a single surgeon. The mean age of the patients was 33.7 ± 9.4 years. SLP was caused by subcutaneous paraffin injection into the penis of all patients within non-medical circumstances. Paraffin administration occurred in a median of 6 (range: 0.5-12) years before reconstruction. An in-house 4-scale grading system was used to assess the severity and depth of the penile skin defect (Figure 1). Grades 1, 2, 3, and 4 SLP were observed in 9, 16, 13, and 11 patients, respectively. According to its extension, SLP was classified into four stages: stage 1, SLP affecting penile skin partially; stage 2, SLP involving the whole length of the penile skin; stage 3, lipogranuloma affecting the penile skin and mons pubis; stage 4, lipogranuloma affecting the penile skin and scrotum with or without mons pubis involvement; stage 4a, subscrotal lipogranuloma is limited to the penoscrotal area; stage 4b, subscrotal lipogranuloma invading the anterior or the whole scrotum, precluding scrotal flap reconstruction. Our staging system is similar to the classification used by Soebhali et al.⁷ Stage 1, 2, 3, 4a, and 4b SLP were detected in 0, 22, 8, and 19, 0 patients, respectively. The new technique was applied, when the size and blood supply of the remaining scrotal skin were adequate. Patients operated on using other reconstructive techniques (closure of the remaining penile skin in stage 1; Cecil-type reconstruction in stages 3-4a, where the scrotal blood supply was potentially compromised after removal of bulky lipogranuloma; and skin graft reconstruction in stage 4b) were not included in the study. The operations were performed under spinal and general anesthesia in 44 and 5 patients, respectively. The first follow-up visit was 3 weeks after surgery, followed by a visit at 3 and 12 months.

After approval by the Regional Institutional Research Ethics Committee (IRD no.: DERKEB/IKEB 5733-2021) and obtaining written informed consent from the patients, data were collected retrospectively by the authors (medical doctors). The length of hospital stay, length of surgery, and intra- and postoperative complications were recorded. Complications were evaluated according to the Clavien-Dindo classification. Eight of 49 (16.3%) patients were lost to follow-up and were defined as no visit after discharge. The mean follow-up period among the remaining 41 patients was 20.0 ± 13.9 months.

The long-term effect of surgery on sexual function and overall satisfaction was measured using a patient-reported questionnaire previously administered by Fakin et al.⁸ The three questions (Q1: ability of erection: yes/no, Q2: ability of sexual intercourse: yes/no, Q3: overall satisfaction with surgery: 1. very unsatisfied, 2. unsatisfied, 3. indecisive, 4. satisfied, 5. very satisfied) were supplemented by an additional one (Q4) regarding pain or tension during erection (yes/no). The questionnaire was completed by mail or telephone interview at least 18 months (mean: 26.9 ± 10.1 months) after surgery. Surgery was considered successful when a patient was satisfied or very satisfied based on their responses to Q3. Overall, 30 (61.2%) patients completed the questionnaire.

Surgical method

After a circumferential subcoronal incision, formal degloving of the penis was performed (Figures 2 and 3). The dissection plane was between Buck's fascia and the lipogranuloma-involved dartos fascia. A dorsal longitudinal skin incision was also necessary to aid in denuding the firm and thickened penile skin. As the proximal border of the penile skin excision, a proximal circumferential incision (PCI) was made on the penile base proximal to the affected skin (Figure 3). Complete removal of the involved tissue is obligatory; thus, lipogranulomas under the mons pubis and scrotum were removed in stage 3-4a SLP. After excision of the lipogranuloma and attached penile skin, denuded penile shaft circumference (a), length (b), and PCI circumference (c) were measured. An $a/2$ long horizontal scrotal incision (HSI) was made $b-(c/2)$ cranially from the point where the PCI touched the scrotal raphe. A subcutaneous tunnel was created between the HSI and the PCI. After the denuded penis was pulled through the tunnel, the HSI was anastomosed to the subcoronal skin edge. The PCI was closed longitudinally. This suture line served as the dorsal midline of the penis (Figure 4). Thereafter, an inverted V-shaped incision was made on the scrotum on the ventral side of the penis, creating the lateral border of the scrotal skin flap. The top of the inverted V was 1 cm from the subcoronal suture line, while the stems of the inverted V were parallel and located $a/2$ from the dorsal midline of the penis on both sides. The incision was deepened until the tunica vaginalis testis, and the testicles were dissected from the scrotal skin flap. The incision was closed in a longitudinal fashion and served as the ventral midline of the penis (Figure 5). No drain was applied, but a 14-16 Ch Foley catheter was placed for 2 days. The penile shaft was wrapped with a non-medicated ointment-impregnated gauze,

which was covered with a povidone-iodine-soaked gauze bandage and a self-adherent wrap. Two days after surgery, the bandage was removed, and the patient was discharged from the hospital (Figures 6 and 7).

COPYRIGHT THE AUTHORS

Results

The mean length of stay was 2.4 ± 1.0 days, mean operating time was 125.4 ± 27.7 min, and overall complication rate was 26.5%. Clavien-Dindo grade 1, 2, 3a, 3b, 4, and 5 complications occurred in the postoperative period 5, 0, 8, 1, 0, and 0 times, respectively, in 13 patients. There were no intraoperative complications. One reoperation occurred during hospital admission on the second postoperative day due to a scrotal hematoma. The hematoma was evacuated, and hemostasis was achieved by coagulation of small scrotal bleeders under general anesthesia. Thirteen procedure-specific complications occurred after discharge in the first 30 days postoperatively; none of them required readmission. Marginal skin necrosis of the scrotal skin flap subcoronally and near the midscrotal suture line occurred in seven and one patients, respectively. Debridement and local wound care were performed. All patients underwent secondary intention healing. Two wound disruptions were observed, penoscrotally and subcoronally, both of which were short and required only local wound treatment. Similarly delayed wound healing occurred in two patients, one subcoronally and one penoscrotally, which was treated with local wound care. A painful subcutaneous hematoma in the penopubic region was observed in one patient, requiring rest and nonsteroidal anti-inflammatory drugs. No patient died during the operation or the postoperative period.

Based on completed questionnaires, erectile dysfunction and pain or tension during erection were observed in two and three patients, respectively. Nevertheless, all patients reported the ability of sexual intercourse. Two patients complained of a lack of foreskin, and one patient had premature ejaculation. Two patients stated that their testicles sometimes slid up next to their penile shaft, while one patient had lymphedema of the remaining distal penile skin. Surgery was successful in 27 patients (90%), as 1, 2, 11, and 16 patients answered unsatisfied, indecisive, satisfied, and very satisfied to Q3, respectively.

Discussion

The desire to enlarge the penis is a major issue for men and is proven by the wide range of penile augmentation methods to increase the penile length, girth, or both. Numerous penile girth enhancement procedures exist, including penile subcutaneous injection therapies using autologous fat, collagen, hyaluronic acid, silicone, and pericavernosal placement of a dermal fat graft or silicone graft.⁹ Although studies have demonstrated low complication rates after these treatment modalities, the complications may be serious and underreported. Therefore, penile girth augmentation should be considered experimental until accurate reporting of complications is achieved.¹⁰

In contrast to the above-mentioned procedures, penile girth enhancement with subcutaneous injection of paraffin is prohibited in medicine due to its proven disastrous consequences. Since paraffin injection is administered in non-medical conditions, the risk of complications is increased. Owing to its illicit nature, it is difficult to estimate the exact number of men who underwent paraffin injection into the penile skin and the rate of its complications.¹¹ Rosecker et al. conducted a questionnaire survey about paraffin self-injection use and its complications among Hungarian inmates; 15.7% of the 1905 responders admitted to self-injection, of which 29.1% regretted. Furthermore, 15.1% and 28.8% were dissatisfied with the size and shape of the penis, respectively.¹² Svensøy et al. studied complications of SLP in 680 patients. The most frequent complications were penile pain (84%), swelling (82.5%), induration (42.9%), purulent secretion (21.8%), ulceration (12.8%), and erythema (8.4%).¹¹

The definitive treatment for SLP is complete removal of the involved penile skin and penile resurfacing.^{1,7} Partial skin deficit following removal of a stage 1 SLP can be resolved by primary closure of the residual intact penile skin.^{1,13,14} Generally, lipogranulomas involve the whole penis, which requires resurfacing with a skin graft^{11,15,16} or scrotal skin flap.^{1,5,6,13-15} Split-thickness skin graft reconstruction results in sexual functional repair and cosmetically acceptable hairless penile skin. It can be applied even in cases when a large part of the scrotum is also involved. Its disadvantages include the risk of graft contraction, need for special instrumentation, and skills for graft harvesting.^{8,11,17,18}

According to similar publications, most patients with SLP are treated with various techniques of scrotal skin flap reconstruction. Its advantages include easy accessibility, mobility, rich vascularity, and similarity to penile skin regarding color, elasticity, and tactile and erogenous sensations.^{19,20} The drawbacks of scrotal skin flaps are hairy skin and their limited size, which can be particularly important issues in SLP with scrotal involvement.

Two-stage scrotal skin flap reconstruction consists of denuded penile shaft embedment into the scrotum in the first stage, followed by liberation of the penis from the scrotum in the second stage. The procedure is relatively easy to perform even without surgical experience in reconstructive urology, but its disadvantage is that it requires two operations, and the penis is in an abnormal position between the two stages.^{4,13,21}

One-stage penile skin reconstruction can be performed using a bilateral scrotal flap, which is a simple and effective method to treat SLP.^{20,22,23} However, wound dehiscence or skin necrosis occurs frequently at the distal part of the flap, particularly near the ventral and dorsal subcoronal T-style anastomosis due to the poor blood supply in this area.⁶ In their study, Shin et al. found delayed wound healing and wound infection in all patients who underwent T-style anastomosis.⁶

Different modifications and new techniques have been described to promote flap survival and wound healing. Bajory et al. published a surgical technique in which skin flaps were transilluminated to visualize scrotal arteries to preserve flap vascularity. With this technique, marginal skin necrosis was observed in three of 12 patients (25%).¹³

Fakin et al. presented a bipediced anterior scrotal flap technique in 43 patients. They found partial skin necrosis, hematoma at the donor site, and partial wound disruption in four (9%), five (12%), and eight (19%) patients, respectively.⁸

Shin et al. introduced a surgical method by applying an inverted V-shaped anastomosis with a bilateral scrotal flap. The subcoronal ventral T-style anastomosis was replaced by an anastomosis based on the principle of V-Y plasty, resulting in no ventral skin necrosis. Of the 14 patients, three experienced delayed wound healing and one had a wound infection during the postoperative period.⁶ We modified this technique to avoid both ventral and dorsal subcoronal T-style anastomosis. Our scrotal flap can be considered a bipedicle local axial flap based on the deep external pudendal artery. At the end of the reconstruction, two

linear and one circular suture lines are located on the penis completely separated from each other, which theoretically reduce the risk of postoperative wound complications. Another advantage of our modification is that the reconstructed skin area between the distal end of the dorsal longitudinal and subcoronal suture line preserves its elasticity and prevents tension during erection. According to our observations, owing to its geometry, our modified reconstruction technique is ideal for resurfacing long-denuded penile shafts.

The comparison of the efficiency and rate of postoperative complications of different penile skin reconstruction methods to treat SLP is difficult. The study population in related articles is low, and the majority of publications are case reports or case series.^{18,22,24} In clinical trials with relatively larger case numbers, patients in different stages of SLP were operated on following different reconstruction techniques.^{1,13,14,16} SLP has no widely accepted classification system regarding the severity and extension of skin defects. In addition, the reporting of complications was not consistent. Nevertheless, our modified penile skin reconstruction technique is comparable to the previously mentioned single-stage scrotal flap technique.^{6,8,13,23} It is a feasible surgical method for the treatment of SLP with low complication and high success rates and good functional results. To our knowledge, this study represents the highest number of patients who underwent surgery with a single-stage scrotal flap reconstruction technique to treat SLP.

The limitations of our paper include being a single-center retrospective study and the high dropout rate observed concerning follow-up visits (16.3%) and questionnaire responses (38.8%). Larger prospective studies could be conducted in multiple centers to mitigate the effect of these limitations.

To improve knowledge regarding the optimal resurfacing method, a standardized classification system should be adopted for the grading and staging of SLP, and a uniform complication reporting system needs to be used.

Conclusions

There is a widely accepted consensus that complete excision of lipogranuloma-affected tissue is mandatory in patients with SLP. However, the type of subsequent penile skin reconstruction technique is controversial. It is mainly determined by the extent of the disease and the surgeon's preference. In patients with SLP with intact scrotal skin, the modified penile skin reconstruction technique presented herein is a safe treatment option with a high success rate.

References

1. Nyirády P, Kelemen Z, Kiss A et al: Treatment and outcome of vaseline-induced sclerosing lipogranuloma of the penis. *Urology* 2008; 71: 1132.
2. Gersuny R: Über eine subcutane Prothese [Concerning a subcutaneous prosthesis]. *Zeitschrift f Heilkunde* 1900; 21: 199.
3. Downey AP, Osman NI, Mangera A et al: Penile Paraffinoma. *Eur Urol Focus* 2019; 5: 894.
4. Kelemen Z, Nyirády P, Bánfi G et al: A hímvessző vastagítása vazelinnel - következmények és azok ellátása [Penile girth enhancement with Vaseline - consequences and their treatment]. *Magy Urol* 2006; 18: 16.
5. Kim SW, Yoon BI, Ha US et al: Treatment of paraffin-induced lipogranuloma of the penis by bipediced scrotal flap with Y-V incision. *Ann Plast Surg* 2014; 73: 692.
6. Shin YS, Zhao C and Park JK: New reconstructive surgery for penile paraffinoma to prevent necrosis of ventral penile skin. *Urology* 2013; 81: 437.
7. Soebhali B, Felicio J, Oliveira P et al: Sclerosing lipogranuloma of the penis: A narrative review of complications and treatment. *Transl Androl Urol* 2021; 10: 2705.
8. Fakin R, Zimmermann S, Jindarak S et al: Reconstruction of penile shaft defects following silicone injection by bipediced anterior scrotal flap. *J Urol* 2017; 197: 1166.
9. Halpern JA, Lai JD and Bernett NE: Textbook of Male Genitourethral Reconstruction: Penile Augmentation, Fact or Fiction. In: Martins FE, Kulkarni SB and Köhler TS: Textbook of Male Genitourethral Reconstruction. Cham: Springer Nature Switzerland AG 2020; 58: 765-781.
10. Hehemann MC, Towe M, Huynh LM et al: Penile girth enlargement strategies: What's the evidence? *Sex Med Rev* 2019; 7: 535.
11. Svensøy JN, Travers V and Osther PJS: Complications of penile self-injections: investigation of 680 patients with complications following penile self-injections with mineral oil. *World J Urol* 2018; 36: 135.
12. Rosecker Á, Bordás N, Pajor L et al: Hungarian "jailhouse rock": incidence and morbidity of Vaseline self-injection of the penis. *J Sex Med* 2013; 10: 509.
13. Bajory Z, Mohos G, Rosecker Á et al: Surgical Solutions for the Complications of the Vaseline Self-Injection of the Penis. *J Sex Med* 2013; 10: 1170.
14. Salauddin SA and Ghazali H: Surgical techniques for correction of penile paraffinoma. *Malays J Med Sci* 2019; 26: 137.

15. Pehlivanov G, Kavaklieva S and Kazandjieva J: Foreign-body granuloma of the penis in sexually active individuals (penile paraffinoma). *J Eur Acad Dermatol Venereol* 2008; 22: 845.
16. Rosellen J, Pflüger M, Bach A et al: Penile Paraffinome – Therapeutische Strategien [Penile paraffinoma-Treatment strategies]. *Urologe A* 2020; 59: 1371.
17. Bjurlin MA, Carlsen J, Grevious M et al: Mineral oil-induced sclerosing lipogranuloma of the penis. *J Clin Aesthet Dermatol* 2010; 3: 41.
18. Vladislav D, Pencho G, Stoykov B et al: Unmeshed split-thickness skin grafts for penile plastic in patients with paraffinoma. *Urol Case Rep* 2020; 32: 101249.
19. Adamyan RT, Kamalov AA, Ehoyan MM et al: Scrotal tissues: The perfect material for urogenital reconstruction. *Plast Reconstr Surg Glob Open* 2020; 8: e2948.
20. Boucher F, Bayoux R, Allepot K et al: The bilateral scrotal flap: Anatomical study and it's use for the management of inflammatory granulomas following custom-made injections. *Ann Chir Plast Esthet* 2021; 4: S0294.
21. Murányi M, Farkas A, Kiss Z et al: A hímvessző bőrének helyreállítása szklerotizáló lipogranuloma okozta deformitás miatt [Staged penile skin reconstruction for sclerosing lipogranuloma]. *Orv Hetil* 2021; 162: 1413.
22. Dunev VR, Kolev NH and Genov PP. Late results of bilateral scrotal flap. *Urol Case Rep* 2019; 27: 1.
23. Jeong JH, Shin HJ, Woo SH et al: A new repair technique for penile paraffinoma: bilateral scrotal flaps. *Ann Plast Surg* 1996; 37: 386.
24. Pereira-Lourenço M, Vieira EBD, Godinho R et al: Giant penis paraffinoma. *Rev Int Androl* 2021; 19: 213.

COPYRIGHT THE AUTHORS

Figure Legends

Figure 1 – Grading system to assess the severity and depth of penile skin defect. Grade 1: sclerosing lipogranuloma located exclusively on the dartos fascia (the skin is easily movable over the lipogranuloma by physical examination). Grade 2: lipogranuloma invades penile skin (lipogranuloma is fixed to the penile skin causing yellowish discoloration and induration). Grade 3: lipogranuloma resulting in penile skin ulcer. Grade 4: lipogranuloma resulting in necrosis of the penile skin.

Figure 2 - Schematic illustration of the surgery: a) The patient is prepped and draped in supine position. b) Following penile skin removal, the exact position ($b-c/2$) and length ($a/2$) of the HSI is based on circumference (a) and length (b) of the denuded part of the penile shaft and circumference of the PCI (c). c) After the penile shaft is pulled through the HSI, subcoronal and dorsal longitudinal suture lines are made. d) An inverted V-shaped incision is made 1 cm proximal from the subcoronal suture line and $b/2$ distance lateral from the dorsal longitudinal suture line on both sides. e) The inverted V-shaped incision is closed in a longitudinal fashion.

Figure 3 – a) Subcoronal and proximal circumferential incision lines are marked on a patient with grade 1/stage 2 SLP. b) Denuded penile shaft with intact Buck's fascia.

Figure 4 – a) HSI is marked. b) Penile shaft is pulled through the HSI. c) Suture lines are performed in two layers with interrupted sutures of 3-0 polyglactin.

Figure 5 – a) Inverted V-shaped skin incision on the ventral side of the penis. b) Incision is closed in a longitudinal fashion in two layers with interrupted sutures of 3-0 polyglactin.

Figure 6 – Penile appearance on the second postoperative day after bandage removal.

Figure 7 – Penile appearance 9 months following surgery.

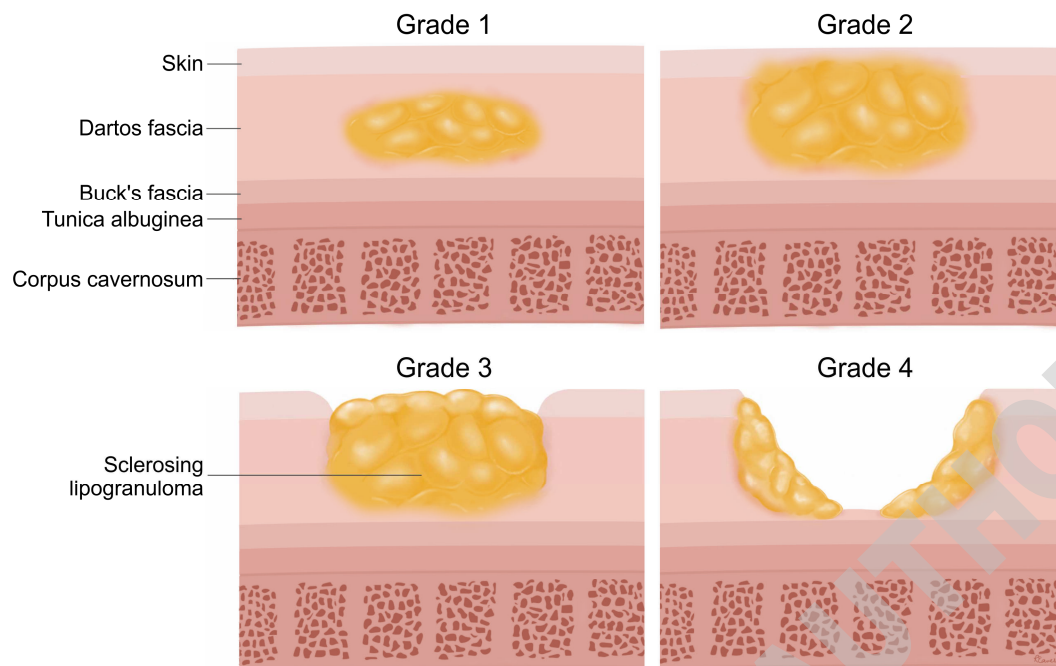
Abbreviations and Acronyms

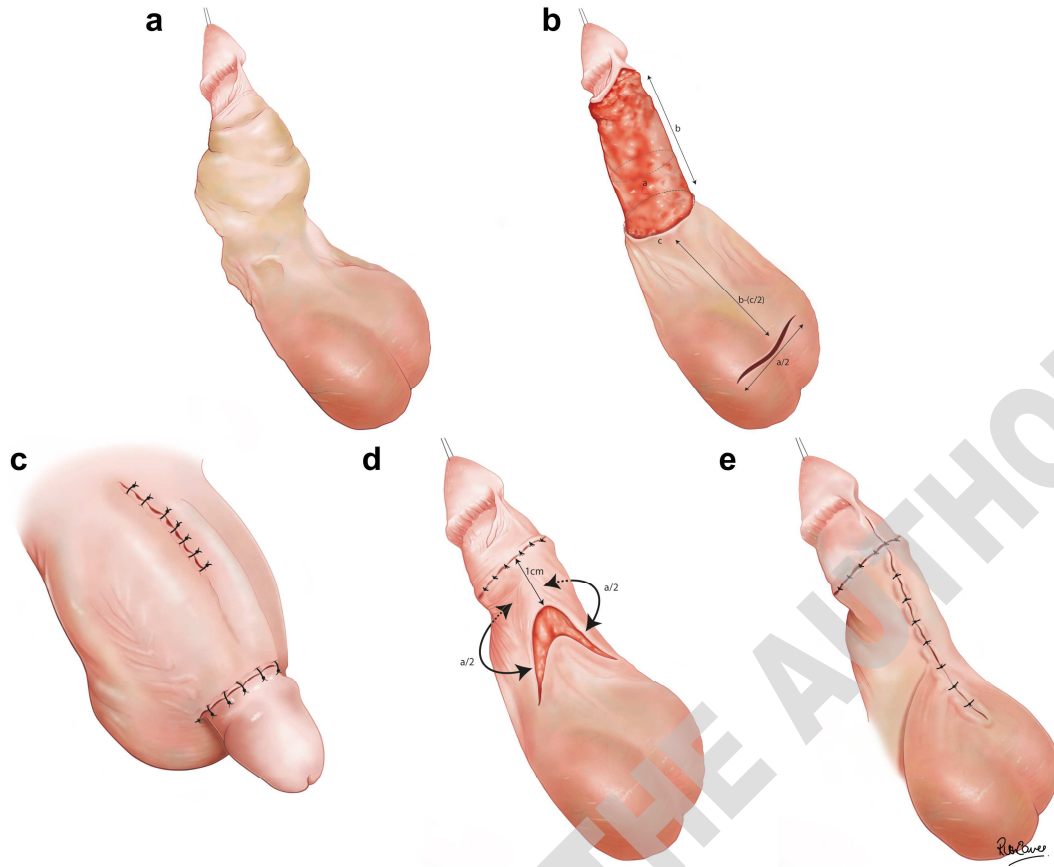
SLP = sclerosing lipogranuloma of the penis

PCI = proximal circumferential incision

HIS = horizontal scrotal incision

COPYRIGHT THE AUTHORS



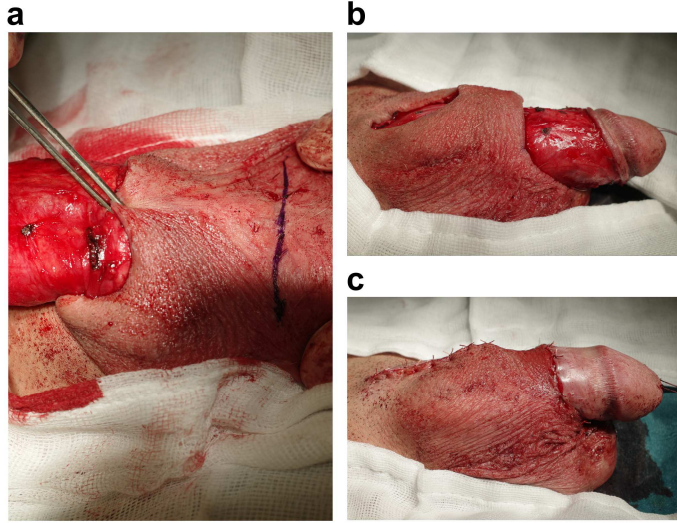


a



b





a



b





