



Standardization of reconstructions with flaps after Fournier's gangrene

Padronização das reconstruções com retalhos após gangrena de Fournier

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■ ABSTRACT

Introduction: Fournier's gangrene is characterized by tissue necrosis, which requires treatment employing debridement and antibiotics with wounds of varying sizes. The objective is to standardize the surgical techniques of reconstructions with flaps used to treat wounds after Fournier's gangrene. **Method:** A study was conducted by searching the PubMed/Medline, SciELO, and LILACS databases. **Results:** In wounds with skin loss of 25% to 50%, a local advancement cutaneous flap or a pudendal flap from the thigh was used; in wounds, greater than 50%, a superomedial thigh flap or myocutaneous flap from the gracilis muscle was used, with the aim of to enable proper reconstruction. **Conclusion:** Advancement and pudendal thigh flaps were used for wounds with up to 50% loss of scrotal skin substance, while the myocutaneous gracilis flap and supero-medial flap of the thigh were indicated for wounds with more than 50% of the total scrotal surface affected, after Fournier gangrene.

Keywords: Fasciitis, necrotizing; Fournier gangrene; Surgical flaps; Perforator flap; Myocutaneous flap; Reconstructive surgical procedures.

■ RESUMO

Introdução: Gangrena de Fournier é caracterizada por necrose tecidual, que necessita de tratamento por meio de desbridamento e antibióticos, com feridas de dimensões variadas. O objetivo é padronizar as técnicas cirúrgicas de reconstruções com retalhos utilizadas no tratamento das feridas após gangrena de Fournier. **Método:** Realizou-se estudo por meio da busca nas bases de dados PubMed/Medline, SciELO e LILACS. **Resultados:** Nas feridas com perdas cutâneas de 25% a 50%, foram utilizados retalho cutâneo local de avanço ou retalho pudendo da coxa, nas maiores de 50% foram necessárias as confecções do retalho superomedial da coxa ou retalho miocutâneo do músculo grácil, com intuito de possibilitar a reconstrução adequada. **Conclusão:** Os retalhos de avanço e pudendo da coxa foram utilizados para feridas com perda de substância cutânea escrotal de até 50%, enquanto os retalhos miocutâneo de músculo grácil e superomedial da coxa foram indicados para as feridas com mais de 50% da superfície escrotal total acometida, após gangrena de Fournier.

Descritores: Fasciite necrosante; Gangrena de Fournier; Retalhos cirúrgicos; Retalho perfurante; Retalho miocutâneo; Procedimentos cirúrgicos reconstrutivos.

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INTRODUCTION

Fournier's gangrene is an infection caused by aerobic and anaerobic microorganisms^{1,2}, which acting synergistically, determine a necrotizing fasciitis^{3,4}, which affects the genital, perineal, and perianal regions⁵⁻⁷. The infection may extend to Scarpa's fascia on the abdominal wall due to the anatomical communications^{8,9} existing

between the layers of the lining of the perineal, scrotal, penile, and abdominal regions¹⁰⁻¹².

The infectious process occurs through endarteritis obliterans, which causes thrombosis of the cutaneous vessels and necrosis of the skin in the affected region^{13,14}. Surgical treatment requires debridement of necrotic tissues, causing wounds of varying extents, which require adequate reconstruction^{15,16}.

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OBJECTIVE

The purpose of the study is to present the standardization of reconstructive surgical treatment of wounds, after Fournier's gangrene, with the use of flaps, through the elaboration of a flowchart, based on the analysis of the literature.

METHOD

The study consisted of searching for evidence related to surgical techniques for reconstructions after Fournier's gangrene through a search in the PubMed, SciELO, and LILACS databases, using the descriptors fasciite necrosante (necrotizing fasciitis), gangrena de Fournier (Fournier gangrene), retalhos cirúrgicos (surgical flaps), retalho perfurante (perforator flap), retalho miocutâneo (myocutaneous flap) and cirurgia plástica (plastic, surgery) combined with the Boolean logical operators *and* or *or*.

An advanced search was performed, limiting it to words in the title and abstract. All stages of the systematic review were conducted by two reviewers, independently and blindly. The articles related to the descriptors that defined the types of flaps used after Fournier's gangrene were included. Duplicate articles were excluded, which did not explain the types of flaps used in the reconstructions and those not directly related to the subject.

RESULTS

The results of the study are shown in Table 1 and Figure 1.

The flowchart of Figure 1 shows that primary closure was possible in wounds with skin loss of up to 25%. In wounds with skin loss of 25% to 50%, local advancement skin flaps were used.

When skin losses were greater than 50%, it was necessary to create a superomedial thigh flap, pudendal thigh flap, or myocutaneous gracilis muscle flap to enable adequate reconstruction.

DISCUSSION

Flaps can present with complications, such as necrosis, dehiscence, and hematomas. Dehiscence is related to tension in the suture planes, necrosis to the poor blood supply to the vascular pedicle of the flap, and hematoma to inadequate hemostasis¹⁷⁻²⁸.

The myocutaneous flap of the gracilis muscle makes it possible to reconstruct wounds with loss of more than 50% of the total scrotal surface, with the advantages of good vascularization, which allows better penetration of antibiotics into the affected tissue, and the ability to fill deep wounds¹⁹⁻²¹.

The scrotal advancement flap offers a good aesthetic result and fulfills the principle of replacing with similar skin, being recommended for scrotal skin loss of up to 50% of the total scrotal surface. The benefits of this method include good skin quality, elasticity, and the presence of the dartos muscle^{17,18,22-24}.

The pudendal flap of the thigh has the important benefit of preserving skin sensation in the region reconstructed by the flap, the presence of a reliable blood supply, and low morbidity in the donor area, being used to cover up to 50% of the scrotal skin^{22,26-29}.

Chart 1. Authors, type of study, and flaps used for wound reconstruction after Fournier's gangrene in the selected articles.

Author	Number of Reconstructions with Flaps*	Kind of study	Surgical technique
Parkash & Gajendran ¹⁷	40	Retrospective	Scrotal advancement flaps = 40
Ferreira et al. ¹⁸	37	Retrospective	Local advancement flaps = 9 Superomedial/thigh flaps = 28
Hsu et al. ¹⁹	8	Retrospective	Gracilis muscle myocutaneous flaps = 8
Coskunfirat et al. ²⁰	7	Retrospective	Perforating flaps of the medial circumflex femoral artery = 7
Lee et al. ²¹	14	Retrospective	Gracilis muscle flaps = 7 Internal pudendal artery perforating flap = 7
Ünverdi & Kemaloğlu ²²	13	Retrospective	Internal pudendal artery perforating flaps = 13
El-Khatib ²³	8	Retrospective	Pudendal thigh flaps = 8
Carvalho et al. ²⁴	16	Retrospective	Scrotal advancement flaps = 16
Bhatnagar et al. ²⁵	12	Retrospective	Thigh fasciocutaneous flaps = 12
Khanal et al. ²⁶	14	Retrospective	Bilateral pudendal flaps = 14
Dadaci et al. ²⁷	29	Retrospective	Limberg flaps/thigh = 29
Karaçal et al. ²⁸	5	Retrospective	Neurovascular flap / pudendal pedicle = 5

*Inclusion and exclusion criteria: cases of reconstructions with flaps were included, and cases of primary closures and skin grafts were excluded.

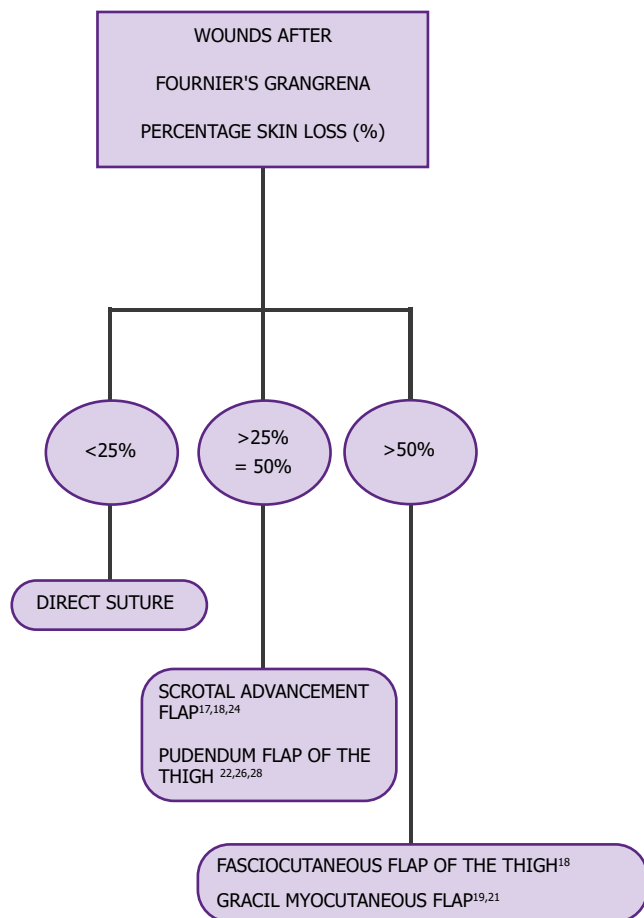


Figure 1. Flowchart for reconstructive surgical treatment of a wound, with skin loss in the scrotal region, after Fournier's gangrene.

The superomedial thigh fasciocutaneous flap is indicated for the repair of wounds with skin loss of more than 50% of the total scrotal surface, in a single surgical procedure and with adequate coverage, in patients in a stable clinical condition, after instability resulting from severe gangrene infection of Fournier¹⁸⁻²⁰, by aerobic and anaerobic microorganisms^{12,30-34} associated with diabetes mellitus, heart disease, and renal failure¹³⁻¹⁵.

The surgical technique using the superomedial fasciocutaneous flap of the unilateral or bilateral thigh allows the reconstruction of the scrotal region, also indicated for perineal and perianal reconstructions. The superomedial fasciocutaneous flap of the thigh has vascularization through the branches of the femoral artery, the internal pudendal, and the circumflex¹⁷, and is safe even in diabetic patients^{1,35} and patients with vasculopathies^{36,37}.

CONCLUSION

The study carried out allowed us to infer that in the reconstruction of wounds after Fournier's gangrene, advancement and pudendal flaps from the thigh were used for wounds with loss of scrotal

cutaneous substance of up to 50%, while myocutaneous flaps from the gracilis muscle and superomedial thigh were indicated for wounds with more than 50% of the total scrotal surface affected.

COLLABORATIONS

RLF Analysis and/or data interpretation, Conception and design study, Conceptualization, Final manuscript approval, Formal Analysis, Investigation, Methodology, Resources, Software, Supervision, Validation, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing.

LCL Analysis and/or data interpretation, Conceptualization, Final manuscript approval, Investigation, Methodology, Resources, Visualization, Writing - Original Draft Preparation, Writing - Review & Editing.

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