

Severe Scrotal Lymphedema: A Diagnostic and Therapeutic Challenge. A Case Report

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ABSTRACT

Scrotal lymphedema is a rare condition characterized by impaired lymphatic drainage and the progressive accumulation of protein-rich fluid within the genital tissues, leading to chronic inflammation, fibrosis, skin thickening, and progressive deformity. In advanced stages, it may cause significant functional, hygienic, sexual, and psychosocial impairment, representing a considerable therapeutic and reconstructive challenge. We present the case of a 60-year-old male patient with progressive bilateral scrotal enlargement associated with marked soft-tissue thickening and fibrosis, consistent with severe scrotal lymphedema. Given the extent of the disease and the presence of chronic tissue changes, surgical management was undertaken through extensive bilateral resection of the affected scrotal skin and subcutaneous tissue. During the procedure, both testes and spermatic cords were identified and preserved. The penis showed no significant involvement and was therefore preserved in its entirety, maintaining its native skin coverage. Following resection, scrotal reconstruction was performed using the remaining viable tissues, achieving adequate coverage of the testes and a substantial reduction in genital volume. The management of scrotal lymphedema should be individualized according to its etiology, extent, and degree of tissue fibrosis. In advanced disease, excision of the affected lymphedematous tissue followed by appropriate reconstruction represents an effective therapeutic option. Preservation of unaffected genital structures and individualized reconstructive planning are essential to minimize surgical morbidity, restore anatomical contour, and achieve satisfactory functional outcomes.

KEYWORDS: Scrotal lymphedema; genital lymphedema; scrotal elephantiasis; scrotal reconstruction; reconstructive surgery; surgical excision.

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INTRODUCTION

Scrotal lymphedema is a rare, chronic, and potentially disabling condition characterized by the progressive accumulation of protein-rich fluid within the soft tissues of the genital region as a consequence of impaired lymphatic drainage. Its prolonged course promotes persistent inflammation, fibrosis, skin thickening, and tissue hypertrophy, which may progress to considerable dimensions and result in significant functional, hygienic, sexual, psychological, and social impairment.

Its etiology can be classified as primary, associated with congenital abnormalities of the lymphatic system, or

secondary to conditions that cause obstruction or injury to the lymphatic vessels, including infections, neoplasms, trauma, surgical procedures, radiotherapy, obesity, and chronic inflammatory diseases. In endemic regions, filariasis represents an important cause; however, in non-endemic countries, secondary etiologies predominate, and in some patients, no specific underlying cause can be identified.

Diagnosis is primarily clinical and should be complemented by a targeted assessment to determine the underlying cause, extent of disease, and involvement of the genital structures. In advanced cases, progressive scrotal enlargement may impair ambulation, urination, personal hygiene, and sexual

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activity, while also predisposing patients to recurrent infections and substantially reducing their quality of life. The differential diagnosis includes infectious processes, hydrocele, edema secondary to systemic diseases, neoplasms, and other conditions associated with scrotal enlargement.

Management represents a significant challenge, particularly in advanced stages characterized by marked fibrosis and deformity. Although conservative measures may be beneficial during the early stages of the disease, severe scrotal lymphedema often requires surgical treatment consisting of extensive excision of the affected tissue followed by reconstruction, with the aim of restoring anatomy, preserving genital function, and improving quality of life. The reconstructive strategy should be individualized according to the extent of the disease, the quality of the remaining tissues, and the clinical characteristics of each patient.

This report describes the case of a patient with severe scrotal lymphedema, addressing the clinical presentation, diagnostic process, and therapeutic management, with particular emphasis on the surgical and reconstructive principles employed to achieve adequate functional and anatomical restoration.

CASE REPORT

A 60-year-old male patient presented for evaluation due to a long-standing, progressive increase in scrotal volume associated with marked soft-tissue thickening and deformity of the genital region. The progressive enlargement resulted in

significant distortion of the normal scrotal anatomy, with functional impairment affecting ambulation, personal hygiene, and activities of daily living.

Physical examination revealed marked bilateral scrotal enlargement accompanied by diffuse thickening of the skin and subcutaneous tissue, with firm consistency and clinical findings consistent with severe chronic lymphedema. Both hemiscrota were involved, resulting in loss of the normal anatomical configuration. The penis was anatomically preserved, with no clinical evidence of significant involvement of the skin or underlying tissues. Both testes were present; therefore, preservation of viable genital structures was established as a priority during the reconstructive procedure.

Based on the clinical findings and extent of the disease, a diagnosis of severe scrotal lymphedema was established. Given the chronic nature of the condition, marked tissue thickening and fibrosis, and the resulting deformity, surgical management was considered the most appropriate therapeutic option.

Surgical planning aimed to achieve extensive excision of the affected scrotal tissue while preserving both testes and spermatic cords, maintaining the penis intact, and subsequently providing stable coverage of the genital structures. The extent of cutaneous and subcutaneous involvement was delineated, identifying severely affected areas as well as viable tissues suitable for subsequent reconstruction



Figure 1. Initial clinical view.



Figure 2. Initial clinical view.

Surgical Technique

Following standard aseptic and antiseptic preparation, the genital, inguinal, and perineal regions were widely prepared. The margins of the affected scrotal tissue were subsequently delineated, and incisions were performed according to the preoperative surgical plan.

Careful layer-by-layer dissection was initiated through the markedly thickened cutaneous and subcutaneous tissues. Progressive and extensive excision of the lymphedematous tissue was performed, including the affected scrotal skin and subcutaneous tissue demonstrating macroscopic evidence of fibrosis and chronic thickening.

The procedure was performed bilaterally, addressing both hemiscrota. During dissection, both testes and their respective spermatic cords were carefully identified and preserved, with

particular attention to protecting the vascular structures and avoiding excessive traction or inadvertent injury. Excision was continued until macroscopically viable tissues suitable for reconstruction were reached.

The penis remained completely intact throughout the procedure. Given the absence of significant involvement of its skin coverage, no penile skin excision, de-epithelialization, or reconstructive procedure was required, thereby preserving its native anatomy and skin coverage.

Following completion of the bilateral excision of the affected scrotal tissue, the surgical bed was meticulously inspected and careful hemostasis was achieved. The integrity and viability of both testes, spermatic cords, and the penis were subsequently confirmed.



Figure 3. Surgical excision of scrotal lymphedema.

Scrotal Reconstruction

Following excision of the lymphedematous tissue, reconstruction of the scrotal region was performed. The remaining viable tissues were mobilized and redistributed to provide adequate coverage of both testes and restore an anatomically and functionally appropriate scrotal contour. Coverage was performed while avoiding excessive tension along the wound edges, maintaining an appropriate position of both testes, and preventing compression of the spermatic

cords. Layered approximation of the tissues was performed to minimize the dead space created after resection and provide stability to the reconstruction.

Finally, skin closure was performed with adequate approximation of the wound edges, achieving complete coverage of the testicular structures and a substantial reduction in scrotal volume. At the completion of the procedure, the integrity of the penis and all preserved genital structures was reassessed and confirmed.



Figure 4. Final clinical view.

Postoperative Management

During the postoperative period, the surgical site was closely monitored to assess the viability of the reconstructed tissues and identify potential complications, including hematoma, seroma, surgical site infection, wound dehiscence, or compromise of the genital structures.

Regular wound care was performed, together with measures aimed at maintaining adequate hygiene of the genital region. The progression of postoperative edema, characteristics of the surgical wound, position and clinical viability of both testes, and integrity of the penis were also closely monitored.

Clinical Course and Outcome

Surgical excision allowed extensive removal of the scrotal tissue affected by the lymphedematous process, resulting in a substantial reduction in the volume and deformity of the genital region. Both testes, their respective spermatic cords, and the entire penis were successfully preserved.

Reconstruction provided adequate coverage of the testicular structures and restored a functional scrotal contour. From a reconstructive standpoint, the objectives of the procedure were not only to remove chronically affected tissue but also to preserve healthy genital structures and restore an anatomical configuration that facilitated mobility, hygiene, and appropriate care of the genital region.

The surgical approach consisting of extensive bilateral excision of the lymphedematous scrotal tissue, complete preservation of the penis, and subsequent scrotal reconstruction successfully addressed the deformity caused

by the disease. This case highlights the importance of individualizing surgical management according to the extent of tissue involvement and the availability of viable tissue for reconstruction.

DISCUSSION

Scrotal lymphedema is an uncommon manifestation of genital lymphedema and may result in considerable anatomical and functional impairment when it progresses to advanced stages. It develops as a consequence of impaired lymphatic transport, resulting in the progressive accumulation of protein-rich fluid within the interstitial space. Persistence of this process leads to chronic inflammation, adipose tissue proliferation, fibrosis, and skin thickening. These changes explain why advanced forms of the disease respond poorly to conservative treatment and frequently require surgical intervention.

From an etiological standpoint, scrotal lymphedema can be classified as primary or secondary. Primary lymphedema results from congenital or developmental abnormalities of the lymphatic system and may become clinically apparent at different ages. In contrast, secondary forms result from damage to or obstruction of previously normal lymphatic vessels or lymph nodes. Reported causes include filariasis, recurrent infectious processes, neoplasms, inguinal or pelvic surgery, radiotherapy, trauma, morbid obesity, and chronic inflammatory diseases. Identifying the underlying etiology is

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clinically relevant because it helps guide treatment and assess the risk of disease progression or recurrence.

Table 1. Main Etiologies of Scrotal Lymphedema

Etiology	Mechanism	Clinical Characteristics
Primary lymphedema	Hypoplasia, aplasia, or dysplasia of the lymphatic system	May present at an early age or become clinically apparent later in life
Lymphatic filariasis	Lymphatic obstruction secondary to parasitic infection	Important in endemic regions; may progress to genital elephantiasis
Inguinal or pelvic surgery	Injury to or disruption of lymphatic vessels and lymph nodes	Surgical history temporally associated with the onset of edema
Radiotherapy	Progressive fibrosis of lymphatic vessels and lymph nodes	May develop months or years after treatment
Neoplasms	Infiltration or compression of lymphatic structures	Should be excluded, particularly in patients with de novo presentation
Recurrent infections	Progressive inflammation and fibrosis of lymphatic vessels	May be associated with recurrent episodes of cellulitis
Trauma	Direct injury to lymphatic vessels	Associated with a history of trauma
Obesity	Functional and structural impairment of lymphatic drainage	May coexist with genital and suprapubic lymphedema
Idiopathic	No identifiable etiology after appropriate diagnostic evaluation	Diagnosis of exclusion

The diagnosis of scrotal lymphedema is primarily clinical. Medical history should establish the duration of the condition, rate of progression, and previous surgical, infectious, oncological, and traumatic events, as well as the presence of systemic diseases and epidemiological risk factors for filariasis. Physical examination should determine the extent of edema, skin characteristics, presence of fibrosis, ulceration or infection, penile involvement, and whether the testes can be identified or palpated.

In advanced cases, diagnosis may be challenging because of the magnitude of scrotal enlargement and distortion of the normal genital anatomy. Complementary diagnostic studies should therefore be individualized according to the clinical presentation. Ultrasonography can be used to evaluate the

scrotal contents and testes and to exclude conditions such as hydrocele or masses. Computed tomography (CT) or magnetic resonance imaging (MRI) may be useful when assessment of deep tissue involvement, pelvic extension, or a potential obstructive etiology is required. In selected cases, lymphoscintigraphy and modern lymphatic imaging techniques may further characterize lymphatic anatomy and function.

One of the fundamental aspects of the diagnostic evaluation is establishing an appropriate differential diagnosis, as scrotal enlargement is not specific to lymphedema and may represent the clinical manifestation of several local or systemic conditions requiring substantially different therapeutic approaches.

Table 2. Differential Diagnosis of Scrotal Lymphedema

Differential Diagnosis	Distinguishing Clinical Features	Useful Diagnostic Tool
Hydrocele	Scrotal enlargement caused by fluid accumulation around the testis; generally less infiltrative	Scrotal ultrasonography
Inguinoscrotal hernia	Mass that may increase with the Valsalva maneuver and extend from the inguinal canal	Physical examination and ultrasonography/CT
Heart failure	Usually bilateral edema associated with peripheral edema and other systemic manifestations	Cardiovascular evaluation
Renal failure	Generalized edema associated with impaired renal function	Renal function tests and urinalysis
Liver disease	Edema associated with ascites and other manifestations of hepatic disease	Liver function tests and imaging
Infection/cellulitis	Erythema, pain, increased local temperature, and possible fever	Clinical assessment and laboratory testing
Fournier gangrene	Severe pain, systemic toxicity, necrosis, and rapid progression	Urgent clinical diagnosis; CT in selected cases

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Scrotal or testicular neoplasm	Localized mass, induration, or progressive enlargement	Ultrasonography and histopathological examination
Genital lipedema/lipomatosis	Predominance of adipose tissue without typical features of lymphatic obstruction	Physical examination and imaging
Scrotal lymphedema	Chronic edema, skin thickening, fibrosis, and progressive deformity	Clinical evaluation ± lymphatic imaging studies

The progression of lymphedema is directly related to the structural changes that occur within the affected tissues. During the early stages, fluid accumulation predominates and the edema may retain a certain degree of reversibility. As the disease progresses, persistent inflammation induces fibrosis and adipose tissue proliferation. In advanced stages, elephantiasis may develop, characterized by massive

enlargement, marked skin thickening, hyperkeratosis, and severe anatomical deformity. This progression has important therapeutic implications, as physiological strategies aimed at improving lymphatic drainage are generally more effective when relatively preserved and functional lymphatic tissue remains.

Table 3. Clinical Staging of Lymphedema and Its Therapeutic Implications

Stage	Characteristics	Tissue Changes	Therapeutic Approach
0 or subclinical	Impaired lymphatic transport without clinically evident edema	Minimal changes	Surveillance and prevention
I	Soft edema that may decrease with limb elevation	Predominance of interstitial fluid accumulation	Conservative treatment
Early II	Persistent edema with limited response to elevation	Early fibrosis	Conservative management ± selected physiologic surgery
Late II	Persistent edema, fibrosis, and skin changes	Fibrosis and adipose tissue proliferation	Physiologic or reductive surgery depending on the individual case
III	Elephantiasis, deformity, marked fibrosis, and skin changes	Advanced fibrosis and substantial tissue enlargement	Reductive/excisional surgery and reconstruction

Treatment should be individualized according to the etiology, stage, extent of involvement, and degree of functional impairment. Conservative measures include skin care, weight management, prevention and prompt treatment of infections, and complete decongestive therapy. However, the anatomy of the genital region makes conventional compression therapy difficult to implement, and in the presence of advanced fibrosis and substantial excess tissue, conservative measures are generally insufficient to achieve a significant reduction in volume.

Physiologic microsurgical techniques, such as lymphaticovenous anastomosis (LVA), aim to redirect lymphatic flow into the venous system and may be particularly useful in selected patients with residual functional lymphatic vessels. Vascularized lymph node transfer (VLNT) represents another reconstructive option used in selected forms of lymphedema. Nevertheless, in patients with advanced scrotal disease characterized by extensive fibrosis, irreversible skin changes, and massive deformity, excision of the affected tissue followed by reconstruction plays a central role in surgical management.

Table 4. Therapeutic Options for Genital Lymphedema

Treatment	Principle	Main Indication	Limitation
Complete decongestive therapy	Promote fluid mobilization and reduce edema	Early-stage disease	Limited effectiveness in advanced fibrosis
Skin care and infection control	Prevent impairment of the skin barrier	All stages	Does not eliminate excess tissue
Lymphaticovenous anastomosis	Redirect lymphatic flow into the venous system	Early disease with functional lymphatic vessels	Limited effectiveness in advanced fibrosis
Vascularized lymph node transfer	Provide functional lymphatic tissue	Selected cases	Greater microsurgical complexity
Liposuction	Reduce the chronic adipose component	Selected lymphedema with predominant adipose tissue proliferation	Does not remove severely affected skin

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Scrotal excision	Remove pathological skin and subcutaneous tissue	Severe lymphedema, fibrosis, and elephantiasis	Requires subsequent reconstruction
Excision and reconstruction	Remove affected tissue and restore coverage	Advanced genital deformity	Reconstructive technique depends on the availability and quality of viable tissue

In the present case, the extent of scrotal involvement and chronic tissue changes justified an excisional approach. Bilateral excision allowed removal of the affected scrotal tissue, while careful identification and preservation of the testes and spermatic cords were essential to maintain the integrity of the deep genital structures. A particularly relevant aspect was the complete preservation of the penis, as the penile tissues showed no involvement that would justify additional excision. This represents an important principle in reconstructive surgery: excision should be sufficiently extensive to remove irreversibly affected tissue while simultaneously preserving all healthy and functional anatomical structures.

Once excision has been completed, the subsequent challenge is to provide stable coverage of the testes and restore an appropriate scrotal configuration. The choice of reconstructive technique depends primarily on the amount and quality of residual scrotal skin, extension of the disease toward the penis and perineum, exposure of deep structures, and availability of regional tissues. When sufficient healthy scrotal skin remains, primary closure and remodeling with local tissue offer the advantage of providing coverage with similar anatomical and functional characteristics. For larger defects, local or regional flaps may be considered, as well as skin grafting in selected circumstances.

Table 5. Reconstructive Options Following Excision of Scrotal Lymphedema

Technique	Advantages	Disadvantages	Ideal Situation
Primary closure/scrotal remodeling	Similar tissue characteristics, relatively straightforward technique, and favorable contour	Requires sufficient viable skin; risk of excessive tension	Moderate defect with adequate residual scrotal tissue
Local scrotal flaps	Good vascularity and similar tissue characteristics	Limited applicability in extensive disease	Partially preserved healthy scrotal tissue
Thigh flaps	Vascularized coverage for extensive defects	Greater tissue bulk and potential alteration of genital contour	Large defects with insufficient local tissue
Regional fasciocutaneous flaps	Robust, well-vascularized coverage	Greater technical complexity and donor-site morbidity	Extensive or complex defects
Split-thickness skin graft	Allows coverage of large surface areas and adapts well to the underlying contour	Graft contraction, aesthetic differences, and requirement for an adequate vascularized recipient bed	Extensive defects with a well-vascularized wound bed
Combined reconstruction	Allows coverage to be tailored to complex defects	Greater technical complexity	Extensive and heterogeneous genital involvement

Preservation of the penis in this patient allowed the reconstruction to be limited to the scrotal region, thereby avoiding additional procedures involving penile skin coverage. Whenever penile tissues are clinically healthy, their preservation reduces the extent of the reconstructive defect and maintains the specialized native skin coverage of the organ. Similarly, protection of the spermatic cords and adequate coverage of the testes are essential components of successful reconstruction.

Surgical treatment of advanced scrotal lymphedema should not be regarded solely as a volume-reduction procedure. The reconstructive goals include restoration of genital anatomy, facilitation of personal hygiene, improvement in mobility, and reduction of the functional limitations caused by massive scrotal enlargement. Potential postoperative complications should also be considered, including infection, seroma,

hematoma, wound dehiscence, necrosis of the tissues used for coverage, and recurrence of lymphedema. Therefore, long-term follow-up represents an essential component of comprehensive management.

This case highlights the importance of tailoring treatment to the anatomical distribution and severity of the disease. In patients with severe scrotal lymphedema and advanced fibrotic changes, extensive excision of the affected tissue followed by individualized reconstruction may represent an effective strategy when conservative measures are insufficient. Preservation of the penis and viable testicular structures, as achieved in the present case, can reduce surgical morbidity while maintaining unaffected anatomical structures. Achieving an appropriate balance between adequate excision of pathological tissue and stable, functional

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reconstruction remains one of the principal challenges in the surgical management of advanced genital lymphedema.

CONCLUSION

Severe scrotal lymphedema is a rare condition with significant functional, anatomical, and psychosocial consequences, and its management represents both a diagnostic and reconstructive challenge, particularly in advanced stages characterized by extensive fibrosis and marked tissue deformity. In such cases, surgical management through extensive excision of the lymphedematous tissue represents an effective therapeutic option for reducing volume and restoring genital anatomy. In the present case, bilateral excision of the affected scrotal tissue, with complete preservation of the penis, both testes, and spermatic cords, followed by scrotal reconstruction, allowed preservation of viable genital structures while providing adequate soft-tissue coverage. The choice of reconstructive technique should be individualized according to the extent of the disease and the availability of healthy tissue, aiming to achieve an appropriate balance between adequate excision of pathological tissue and maximal preservation of function. A multidisciplinary approach, meticulous surgical planning, and long-term follow-up are essential to minimize complications, detect recurrence, and achieve satisfactory functional and reconstructive outcomes.

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