

Complex Traumatic Abdominoperineal Degloving Injury with Bilateral Testicular Avulsion and Complete Penile Urethral Transection: Successful Multidisciplinary Reconstruction and Functional Recovery

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Abstract

Traumatic degloving and high-energy avulsion injuries of the lower abdomen and male genitalia are rare, severe industrial emergencies. These complex abdo-perineal disruptions present immense reconstructive challenges, requiring a strategic balance of acute lower urinary tract stabilization and staged tissue reconstruction. A 40-year-old male industrial worker sustained heavy machine-induced trauma, resulting in a large lower abdominal defect with high-friction thermal margins, complete scrotal skin avulsion, total traumatic amputation of both testes, and complete distal penile urethral disconnection. Emergency management included radical debridement, bilateral spermatic cord ligation, and primary end-to-end urethral anastomosis over a catheter. Postoperative negative pressure wound therapy promoted granulation tissue, preparing the defect for a split-thickness skin graft from the thigh. At a two-month follow-up, cystoscopy confirmed excellent urethral patency, and the patient achieved uninhibited spontaneous voiding after catheter removal. Prompt anatomical realignment combined with staged vacuum-assisted closure and autologous skin resurfacing optimizes outcomes in devastating urogenital trauma.

Keywords

Degloving Injury, Genital Trauma, Bilateral Testicular Avulsion, Penile Urethral Transection, Negative Pressure Wound Therapy, Split-Thickness Skin Grafting, Reconstructive Urology

1. Introduction

Traumatic degloving injuries of the lower abdomen, perineum, and male external genitalia represent a rare, complex subset of severe polytrauma [1]. These injuries occur almost exclusively in industrial or agricultural environments when clothing or body parts become caught in rotating heavy machinery [1]-[3]. The biomechanical mechanism involves intense avulsion and shear forces tearing skin and subcutaneous tissue from underlying deep fascial frameworks [1] [4]. Due to prominent pelvic vascularity, these presentations frequently involve life-threatening hemorrhage, systemic shock, immediate polymicrobial contamination, and severe psychosexual challenges [1] [4] [5].

Severe shear forces stripping scrotal skin frequently cause complete exposure, rupture, or total avulsion of underlying testicular parenchyma [1] [2]. Concurrently, the anterior lower urinary tract is highly vulnerable; severe twisting or pulling stress can cause complete transection of the penile or bulbous urethra [1] [2] [6]. Immediate multi-slice computed tomography urography is essential for early pelvic and urinary tract mapping to optimize reconstructive planning [6].

Management demands immediate execution by trauma, urological, and plastic reconstructive surgeons [1] [4] [5]. Initial care must prioritize rapid hemodynamic resuscitation, broad-spectrum antibiotics, and exhaustive surgical debridement of contaminated or devitalized tissue [1] [2] [5]. Following stabilization, management of large tissue voids is enhanced by negative pressure wound therapy (NPWT) [1]. NPWT controls local exudates, minimizes bacterial colonization, and stimulates granulation, optimizing subsequent staged soft-tissue resurfacing with autologous split-thickness skin grafts [1] [3] [7].

To our knowledge, reports describing the simultaneous occurrence of extensive lower abdominal degloving, complete bilateral testicular avulsion, and complete distal penile urethral transection managed with immediate primary urethral reconstruction and staged wound resurfacing are exceedingly rare. This case highlights a successful reconstructive strategy that achieved early restoration of urethral continuity and satisfactory wound healing despite devastating combined genitourinary injuries.

2. Case Presentation

A 40-year-old male presented to the emergency department after a severe rubber factory accident involving high-impact mechanical crush and shearing forces to the lower abdomen, external genitalia, left upper extremity, and mid-back. He was

fully conscious (Glasgow Coma Scale 15) and hemodynamically stable with normal primary ATLS survey (Advanced Trauma Life Support).

Secondary survey revealed a massive open lower abdominal wall defect inferior to the umbilicus, non-penetrating to deep fascia. Genital injuries included complete penile degloving, total scrotal skin loss, traumatic avulsion of both testicles, and complete penile urethral disconnection consistent with a high-grade external genital injury according to the American Association for the Surgery of Trauma (AAST) Organ Injury Scale (**Figure 1** left and right).

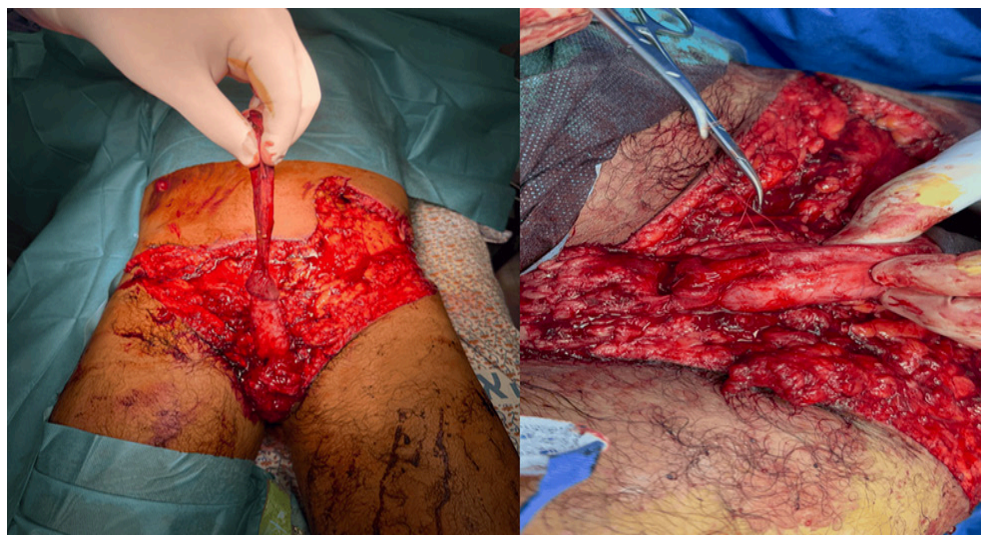


Figure 1. (left) - A massive, open soft-tissue defect was localized across the entire lower abdominal wall inferior to the level of the umbilicus. (right) - Partially defect of penile urethra and total avulsion of both testes.

Additional wounds included a left arm laceration and deep open mid-spine wound. Digital rectal exam was normal. E-FAST (Extended Focused Assessment with Sonography for Trauma) showed no free fluid. Contrast-enhanced CT confirmed a large soft-tissue defect of the lower abdomen, pelvis, and genital region with subcutaneous emphysema extending to bilateral inguinal regions and left thigh, but no intra-abdominal fluid or solid organ injury. Renal excretion was preserved.

The patient was taken to the operating theatre. Both avulsed spermatic cords were ligated and excised at the external rings.

Given the obvious open urethral disruption within the traumatic wound, pre-operative retrograde urethrography was not performed, and definitive confirmation of complete urethral transection was made intraoperatively.

The distal urethral injury underwent primary end-to-end reconstruction with a 16-French Foley catheter and tension-free sutures. Penile skin was debrided, re-approximated, and fenestrated. Deep scrotal tissue provided vascularized urethral coverage. Lower abdominal wound margins were partially closed with staples (**Figure 2** left and right).



Figure 2. (left) - Penile skin was thoroughly debrided and reapproximated. (right) - Partial abdominal skin closure.

Immediate primary end-to-end repair was selected because the urethral injury was located distally, both urethral ends were clearly identifiable, tissue viability was preserved following debridement, and a tension-free anastomosis could be achieved. Delayed reconstruction was therefore considered unnecessary and potentially associated with additional morbidity.

Split-thickness skin grafting was deferred. Arm and back lacerations were closed primarily. Postoperatively, the patient was admitted to the ICU (Intensive Care Unit) and extubated successfully. Negative-pressure wound therapy was applied to abdominal and perineal defects. Intramuscular testosterone and broad-spectrum antibiotics were given after bilateral orchiectomy.

On day 17, definitive closure was performed. After re-debridement, a split-thickness skin graft from the left thigh was applied to abdominal and genital defects (**Figure 3**).



Figure 3. Autologous split-thickness skin graft.

The patient was discharged with the Foley catheter in place.

At two-month follow-up, all wounds and grafts healed successfully with complete graft take and no evidence of wound infection, graft loss, or skin necrosis. Penile anatomy was preserved. Follow-up cystoscopy demonstrated a widely patent urethral lumen without evidence of stricture (**Figure 4** left and right).

After catheter removal, the patient voided spontaneously with satisfactory urinary flow, maintained urinary continence, and reported no lower urinary tract symptoms. No urethral or wound-related complications were identified during follow-up. Long-term endocrinological surveillance was initiated following bilateral orchiectomy.

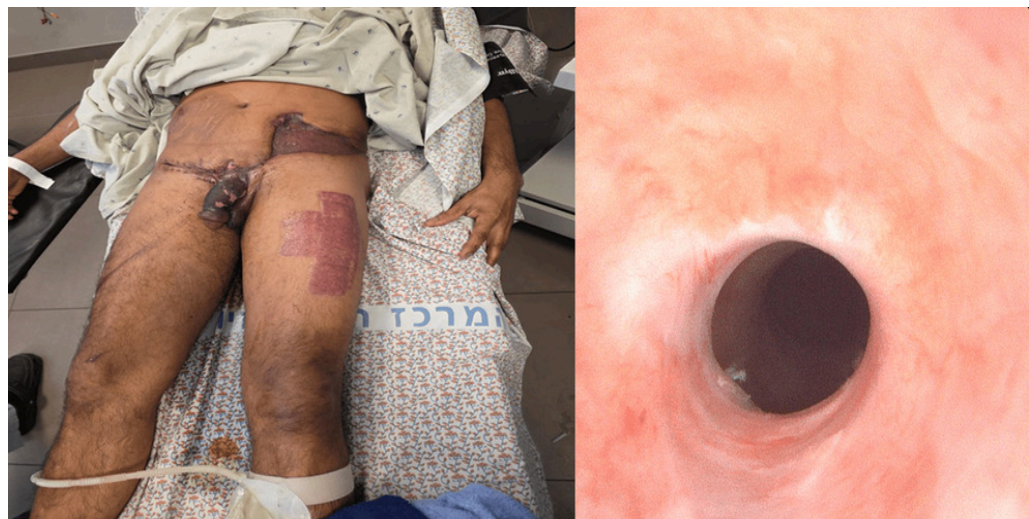


Figure 4. (left) - Two months following surgery. (right) - Follow-up cystoscopy (Patent Urethra).

3. Discussion

The principal clinical novelty of this case is the successful management of a rare combination of extensive abdomino-perineal degloving injury, bilateral traumatic orchiectomy, and complete distal penile urethral transection using immediate primary urethral repair followed by staged reconstruction.

Successful management of extensive abdo-perineal degloving trauma combined with complete genitourinary avulsion requires an organized, staged interdisciplinary strategy [1] [4]. As demonstrated by Lee *et al.* (2022), early aggressive surgical debridement within 24 hours combined with immediate urinary diversion significantly minimizes necrotizing fasciitis and shortens hospitalization [1]. Hakim *et al.* (2016) emphasize that early application of continuous NPWT provides superior wound bed optimization, reducing bacterial counts and accelerating healthy granulation tissue formation [5]. Continuous topical negative pressure acts as a critical biological stabilizing bridge prior to staged autologous resurfacing [7].

Mathur *et al.* (2010) emphasize that the uniquely rich vascular supply of the penile shaft frequently allows severely compromised local skin remnants to be debrided, fenestrated, and reapproximated primarily [2]. When complete denu-

dation occurs, Aineskog and Huss (2016) demonstrate that early autologous split-thickness skin grafting provides excellent long-term aesthetic and functional outcomes, preventing subsequent chordee or painful erectile contractures [3]. While small partial urethral tears can occasionally heal with prolonged catheterization, high-grade lacerations require urgent end-to-end surgical realignment [1] [2] [8]. Performing meticulous primary tension-free anastomosis over an indwelling catheter protects the corpus spongiosum, dramatically lowering long-term incidence of stricture formation or chronic voiding dysfunction, as observed in our patient.

This report has several limitations. As a single-case experience, the findings may not be generalizable to all patterns of severe genitourinary trauma. In addition, follow-up duration remains relatively short, limiting assessment of delayed complications such as urethral stricture recurrence, long-term skin graft durability, chronic voiding dysfunction, endocrine consequences of bilateral orchiectomy, and psychosexual outcomes. Longer surveillance will be required to fully evaluate the durability of the reconstruction and its complete patency [1] [2] [4] [8].

4. Conclusions

Traumatic abdo-perineal degloving with complete genitourinary avulsion represents one of the most surgically demanding injury patterns encountered in industrial trauma. This case demonstrates that favorable functional and anatomical outcomes are achievable through rapid hemodynamic stabilization, meticulous primary urethral reconstruction, and staged wound closure supported by NPWT. Multidisciplinary collaboration between trauma, urological, and plastic surgery teams remains the cornerstone of successful management.

Long-term endocrinological surveillance following bilateral orchiectomy is essential. Early institutional protocols addressing such complex polytrauma are strongly recommended to optimize patient survival and quality of life.

Author Contributions

*Muhammad Mahajna (First Author/Department of Urology): Contributed to patient care, data collection, literature search, and drafting the initial manuscript.

*Husein Hijazi (Department of Urology): Assisted in clinical data collection, case documentation, and reviewing the literature.

*Wesal Akariya (Department of Urology): Contributed to manuscript drafting, image preparation, and proofreading.

*Gabi Shoukaier (Department of Urology): Participated in perioperative urological management and critical revision of the manuscript.

*Ran Katz (Department of Urology): Provided senior urological oversight, patient management supervision, and critical revision of the manuscript for intellectual content.

*Alexander Braslavsky (Department of Surgery, Trauma Unit): Managed initial

trauma evaluation, hemodynamic resuscitation, primary survey assessment, and contributed to the surgical section of the manuscript.

*Kasis Shoukry (Plastic Surgery Unit): Oversee staged plastic and reconstructive surgical procedures, negative pressure wound therapy (NPWT), skin grafting, and contributed to the reconstructive section of the manuscript.

*Tarek Taha (Corresponding Author/Department of Urology): Conceived the case report, performed/supervised the main urological surgical reconstruction, coordinated the multidisciplinary team, critically revised the manuscript, and approved the final version for submission.

Consent

The image shows a printed form titled "Patient Consent for Publication of a Case Report and Clinical Images" from Ziv Medical Center. The form is in Hebrew and English. It includes contact information for the Department of Urology at Ziv Medical Center, Zefat, 13100. The form contains a title for the case report: "Title of Case Report (Complex Traumatic Abdominoperineal-Genital Degloving Injury with Bilateral Testicular Loss and Urethral Injury: A Comprehensive Multidisciplinary Approach)". It states that the patient, whose name is redacted, gives voluntary consent for their medical information and clinical photographs to be used for the preparation and publication of a medical case report. The patient acknowledges that their medical history, diagnosis, treatment, and clinical course may be described in the case report, and that clinical photographs may be included in the publication. It also states that reasonable efforts will be made to protect the patient's identity by removing their name and other direct personal identifiers, but complete anonymity cannot be guaranteed. The patient understands that the case report and photographs may be published in a medical journal and may also appear in printed and electronic formats accessible worldwide. The patient further understands that they will not receive any financial compensation for the publication of their information or images, that their participation is voluntary and that their medical care will not be affected by their decision to give or refuse consent, and that they have had the opportunity to ask questions and all of their questions have been answered to their satisfaction. At the bottom, the patient confirms that they have read and understood this consent form and voluntarily agree to the publication of their anonymized medical information and clinical photographs. There are fields for Patient Name, Patient Signature, and Date, with the patient's signature and date filled in.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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List of Abbreviations

ABCD:	Airway, Breathing, Circulation, Disability
ATLS:	Advanced Trauma Life Support
CT:	Computed Tomography
E-FAST:	Extended Focused Assessment with Sonography for Trauma
GCS:	Glasgow Coma Scale
ICU:	Intensive Care Unit
ISS:	Injury Severity Score
NPWT:	Negative Pressure Wound Therapy
STSG:	Split-Thickness Skin Grafting
VAC:	Vacuum-Assisted Closure
AAST:	American Association for the Surgery of Trauma