

## Case Report

## NEGLECTED THIRD-DEGREE BURN WOUNDS OF THE LOWER LIMBS: FULL-THICKNESS SKIN GRAFT TECHNICAL AND FUNCTIONAL CONSIDERATIONS

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## ABSTRACT

This case report describes the reconstruction of neglected bilateral deep burns near the popliteal joints in a 50-year-old woman with severe restriction of knee extension. The burn area was estimated at 25% TBSA (22% partial-thickness; 3% full-thickness). Under general anaesthesia, eschar was excised to the fascia, and inguinal full-thickness skin grafts (FTSGs) were applied; donor sites were closed primarily. Therasorb and transparent dressings protected the grafts, and a back slab was used for two weeks. Inpatient cefotaxime and discharge cefadroxil were documented. Daily rehabilitation began after immobilisation. Complete clinical graft take was reported within two to three weeks, and knee extension improved qualitatively, without goniometric measurements. This case illustrates technical and functional considerations of FTSG adjacent to highly mobile joints.

**Keywords:** Skin Graft Viability; Burns; Third-Degree; Grafts; Skin; Full-Thickness; Autologous Transplantation; Thigh Injuries

Laporan kasus ini mendeskripsikan rekonstruksi luka bakar bilateral yang tidak tertangani pada *regio poplitea* di sekitar sendi lutut pada seorang perempuan berusia 50 tahun yang mengalami keterbatasan berat dalam ekstensi lutut. Luas luka bakar diperkirakan mencapai 25% dari total luas permukaan tubuh (*total body surface area*, TBSA), yang terdiri atas luka bakar derajat ketebalan parsial sebesar 22% dan luka bakar derajat ketebalan penuh sebesar 3%. Di bawah anestesi umum, dilakukan eksisi eskar hingga mencapai fascia, kemudian dilanjutkan dengan penutupan defek menggunakan cangkok kulit ketebalan penuh (*full-thickness skin graft*, FTSG) yang diambil dari regio inguinal. Luka donor ditutup secara primer. Cangkok kulit dilindungi menggunakan Therasorb dan balutan transparan, sedangkan imobilisasi dilakukan menggunakan bidai posterior (*back slab*) selama 2 minggu. Selama perawatan di rumah sakit, pasien mendapatkan sefotaksim dan selanjutnya dipulangkan dengan terapi sefadroksil. Rehabilitasi harian dimulai setelah periode imobilisasi berakhir. Integrasi cangkok kulit secara klinis dilaporkan tercapai dalam waktu 2 hingga 3 minggu, disertai perbaikan ekstensi lutut berdasarkan penilaian kualitatif, meskipun tidak dilakukan pengukuran menggunakan goniometer. Kasus ini menyoroti pertimbangan teknis dan fungsional dalam penggunaan cangkok kulit ketebalan penuh untuk rekonstruksi luka bakar pada area yang berdekatan dengan sendi yang memiliki mobilitas tinggi.

**Kata Kunci:** Viabilitas Cangkok Kulit; Luka Bakar Derajat Tiga; Cangkok Kulit; Cangkok Kulit Ketebalan Penuh; Transplantasi Autologus; Cedera Paha.

## Conflicts of Interest Statement:

The author(s) listed in this manuscript declare the absence of any conflict of interest on the subject matter or materials discussed.

## INTRODUCTION

Burns may cause substantial functional impairment, particularly when deep injuries occur

across joints<sup>1</sup>. Full-thickness burns destroy both epidermis and dermis and generally require operative wound closure. Delayed assessment and debridement may complicate wound-bed preparation, increase

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infection concerns, and prolong restricted movement. These challenges are especially important near the popliteal fossa, where flexion and extension expose a graft to movement and shear.

Autologous skin grafting remains central to deep-burn reconstruction; split-thickness skin grafts (STSGs), full-thickness skin grafts (FTSGs), and selected substitutes have different indications.<sup>2,3</sup> Although STSGs are widely used for larger burns, FTSGs may be considered for smaller defects where skin quality and secondary contraction are important, provided the recipient bed is vascularized.<sup>4,5</sup> Reports specifically detailing delayed bilateral burns near the popliteal region and the technical considerations for FTSG are limited. This report describes the operative strategy, early graft survival, and the practical limitations of assessing function in such a case.

## CASE REPORT

A 50-year-old woman presented to the Royal Dermatology and Aesthetic Centre (RDAC) on June 26, 2025, with severe pain, stiffness, and limited leg movement. Four days earlier, she had sustained burns from a 3-kg LPG-cylinder explosion in Bali, Indonesia. Initial care consisted of analgesics and cold compresses without debridement. She subsequently developed fever, increasing pain, and inflammation, raising concern for wound infection. No wound culture or susceptibility testing was performed. Available laboratory testing (June 28, 2025) showed leukocytes 9,320/ $\mu$ L, neutrophils 78%, lymphocytes 12%, haemoglobin 11.2 g/dL, platelets 148,000/ $\mu$ L, and ESR 16 mm/h. These findings do not independently establish sepsis or phlebitis, and confirmatory diagnostic criteria were not documented.

Examination revealed deep partial- and full-thickness burns across the posterior flexor surfaces of both thighs near the popliteal regions, with eschar formation. Initially, the patient could not fully extend her knees, with severe restriction of movement. Burn extent was recorded as 25% TBSA, comprising 22% partial-thickness and 3% full-thickness injury. Excision and grafting were scheduled approximately one week after injury. Formal preoperative knee range-of-motion measurements were not obtained. Individual wound dimensions were not documented; burn extent was estimated using TBSA assessment.

Under general anaesthesia, necrotic tissue was excised to the fascia overlying the biceps femoris long head and semitendinosus muscles. Autologous FTSGs were harvested from the inguinal region and secured over the prepared defects. The donor sites were closed primarily with sutures. Graft dressings consisted of Therasorb covered with a transparent dressing. Back-

slab immobilisation was maintained for two weeks to minimise shear. Subsequently, daily mobility exercises with a foam roller, compression stockings, and physiotherapy were undertaken. Recorded treatment included Ringer's lactate 2,000 mL/24 h; intravenous cefotaxime 1 g twice daily (administered for five days), ketorolac one ampoule three times daily, and paracetamol 500 mg three times daily. A discharge prescription listed oral cefadroxil 500 mg twice daily for five days, tramadol three times daily for five days,



and ranitidine three times daily for five days.

**Figure 1.** Preoperative evaluation.

## DISCUSSION

The main reconstructive challenge was the location of bilateral deep wounds near the popliteal fossae. Repeated knee movement creates shear that may interfere with graft adherence; conversely, prolonged immobilisation may contribute to stiffness. We chose FTSG to provide full-dermis coverage for a functionally demanding region. The inguinal donor site offered compatible pliable skin and a relatively concealed scar. Selection of FTSG in this patient is an individual operative decision, not evidence of superiority for all popliteal burns.

Graft-to-bed contact and recipient-bed vascularity are essential to graft survival. The grafts were tailored to fit the defects, with attention to secure contact and minimising movement. Therasorb and a transparent dressing covered the grafts, while a back slab limited early movement for two weeks. After immobilisation, daily foam roller exercises, compression stockings, and physiotherapy supported recovery. Complete clinical graft take was reported within two to three weeks, with wound coverage visible at two months. Knee extension and mobility improved after surgery compared with the initial severe limitation; however, no objective goniometric measurements were available, and late contracture outcomes remain unknown.

STSGs are frequently used for burn wound coverage because they can cover larger defects and have relatively favourable initial take; however, they may undergo greater secondary contraction than FTSGs.<sup>4,5</sup> FTSGs retain the entire dermis but have greater metabolic demands and require a well-vascularized recipient bed.<sup>4</sup> Local or regional flaps may be considered when vital structures are exposed, or a graft bed is unsuitable, while skin substitutes may be useful in selected complex wounds.<sup>2,3</sup> The size and vascularity of the defect, donor-site morbidity, infection control, and anticipated joint movement should guide the choice rather than burn depth alone. Graft failure may result from infection, hematoma, seroma, or shear.<sup>7</sup>

Delayed care made assessment of eschar, wound contamination, and readiness for reconstruction important. Fever and local inflammation raised concern for infection, and cefotaxime was documented during inpatient treatment, followed by cefadroxil on discharge. However, no wound culture was performed, and the available laboratory results and records do not independently confirm sepsis or phlebitis.<sup>6</sup> Excision, recipient-bed preparation, dressings, and two weeks of back-slab immobilisation supported early coverage.<sup>8</sup>

Recent reports of neglected burns and post-burn contractures provide useful context, although their anatomical sites, timing, and reconstructive procedures differ from the present case. Abdulrazzak et al. described a woman who presented approximately 13 months after a neglected burn with extensive neck contractures and underwent release and split-thickness skin grafting; follow-up was unavailable, limiting conclusions about long-term function.<sup>9</sup> In a four-case report from a lower-income setting, Fanstone and Karim Khan illustrated how differences in access to specialist burn care, early wound closure, positioning, and rehabilitation may contribute to different contracture outcomes.<sup>10</sup>

These reports support the clinical importance of delayed burn care and functional rehabilitation, but they do not directly compare acute wound coverage of the popliteal region. More directly relevant to graft selection around joints, Yeh and Lin retrospectively compared 28 patients receiving full-thickness skin grafts (FTSGs) or artificial dermis followed by split-thickness skin grafting (AD-STSG). Median graft take was similar (96% versus 95%), while the FTSG group had better 12-month Vancouver Scar Scale scores and joint-activity recovery; however, two FTSG patients with larger defects developed donor-site dehiscence, and the difference in contracture requiring revision was not statistically significant.<sup>11</sup> A 2026 report of bilateral post-burn popliteal contractures treated with STSG also described restoration of full knee extension after contracture release, wound-bed preparation,

fixation, and back-slab immobilisation.<sup>12</sup> Together, these reports indicate that both FTSG and STSG-based approaches can be useful in selected circumstances; graft choice should be individualised according to defect size, recipient-bed quality, donor-site availability, and functional requirements.



**Figure 2A.** Intraoperative and after escharotomy procedure. Clinical condition of patient's right thigh.



**Figure 2B.** Intraoperative and after escharotomy procedure. Clinical condition of patient's left thigh



**Figure 3.** Post operative evaluation. Clinical condition of patient's bilateral thighs (2 months post-operation)

This report's main contribution is not the introduction of a new grafting technique, but the practical application of established reconstructive principles in a patient with neglected bilateral burns near highly mobile joint regions and a complicated clinical course. The case highlights the importance of matching graft selection to anatomical and functional requirements, adequately preparing the recipient site, closing the donor sites appropriately, and minimising postoperative shear through fixation and immobilisation. Limitations include the single-case design, the absence of wound dimensions beyond estimated TBSA, unmeasured pre- and postoperative knee ROM and pain, the absence of microbiological testing, and limited assessment of late contracture or donor-site outcomes.

## CONCLUSION

In this case of delayed bilateral deep burns near the popliteal fossae, excision and inguinal full-thickness skin grafting achieved complete early graft take. Knee extension improved qualitatively after surgery, following initial severe limitation. We documented general anaesthesia, primary sutured donor-site closure, temporary immobilisation, and rehabilitation after graft stabilisation. However, this single case cannot establish quantitative functional recovery, long-term contracture prevention, or comparative efficacy.

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## CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient for publication of this case report and the accompanying clinical photographs.

## ETHICAL APPROVAL

Ethics committee approval was not required for this case report in accordance with institutional policy.

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## DECLARATION OF GENERATIVE AI USE

The authors declare that no generative artificial intelligence (AI) tools were used in the preparation, writing, or revision of this manuscript.

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