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CASE REPORT

Patient-made axillary crutches enabled home-based rehabilitation: A case report

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Abstract

Background: Pelvic fractures substantially impair mobility and functional recovery, particularly in low- and middle-income countries where access to rehabilitation services and assistive devices is limited. This report highlights the role of patient-led innovation at the patient's home in addressing such constraints.

Case description and management: A 68-year-old physically active man from rural Bangladesh sustained a stable pelvic fracture following a fall. He was managed non-surgically. Due to the unavailability of standard mobility aids and financial constraints, the patient himself designed and constructed an axillary crutch using locally sourced bamboo and wood. A physiatrist trained him on safe crutch use and proper gait through in-person visits and telemedicine. Iterative functional trials informed device modifications to ensure appropriate fit, reduce axillary pressure, and support an effective three-point gait. Follow-up at 6, 9, and 12 weeks post-discharge demonstrated progressive improvement in mobility and pain control. The Functional Independence Measure score improved from 115 at baseline to 123 at final follow-up.

Conclusions: This case demonstrates that with proper guidance and motivation, patient-driven, low-cost assistive technologies can be a viable means of functional recovery in resource-limited settings. This example of patient-led assistive device development and its use may assist people who work in community-based rehabilitation.

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Key messages

This case demonstrates how a motivated patient in a rural, resource-limited setting achieved early mobility and functional recovery using locally made axillary crutches under the guidance of a physiatrist. This example of patient-led assistive device development and its use may assist people who work in community-based rehabilitation.

Introduction

Traumatic pelvic fractures, resulting from high-energy trauma such as falls, are a important cause of morbidity and disability [1]. These injuries often lead to severe pain, impaired mobility and are frequently associated with other injuries, complicating recovery [2]. Effective management requires a multidisciplinary approach, beginning with initial trauma care and followed by comprehensive medical rehabilitation. However, a substantial gap in rehabilitation services persists globally and in many low- and middle-income countries (LMIC). Over half the population lacks access to essential rehabilitation services, and as few as 5-15% of those who need assistive devices receive them [3, 4, 5].

Innovative, context-specific solutions are needed to address disparities in access to rehabilitation. Highly motivated individuals, supported by professional guidance and local knowledge, can develop effective ways to meet their rehabilitation needs. This case report describes a financially constrained patient who, lacking standard equipment, designed and built his own axillary crutches, enabling functional recovery.

Case description and management

A 68-year-old physically active man from a rural community presented to a local clinic with a pelvic fracture sustained after falling from a second-floor rooftop. He had no formal education and no chronic comorbidities such as diabetes or hypertension. He lives with his wife, and three of his four sons work abroad. Despite his age, he was cognitively alert and socially engaged.

Initial clinical and radiographic evaluations revealed a stable fracture of the superior pubic ramus and a left hip sprain. Given the stable fracture and the absence of neurovascular deficiency, the patient was managed conservatively under orthopaedic care, with in-person and remote physiatric consultations in accordance with the Advanced Trauma Life Support protocol [6].

Initial management focused on bed rest, pain control, and proper positioning. The patient's initial pain score was 8/10 on the Visual Analogue Scale (VAS), which decreased to 4/10 within two weeks with analgesics. A physiatrist-designed exercise programme was initiated during his hospital stay, including breathing exercises, upper-limb strengthening, crutch muscle exercises, and pre-ambulatory training. Hands-on axillary crutch demonstrations and safety education were provided during ward rounds.

Upon discharge from hospital, the patient was instructed to progress to a non-weight-bearing protocol. Faced with financial constraints and the unavailability of standard mobility aids, he constructed an assistive device and trained using a bamboo parallel bar and wooden auxiliary crutches. He had received a demonstration of the proper use of axillary crutches during his hospital stay and used this knowledge to guide the design. The crutches were crafted from pieces of wood, with padded axillary supports and an iron-hooked, handgrip-secured design (Figure 1). He adjusted the device based on functional trials to ensure a comfortable fit that allowed slight elbow flexion and minimised axillary pressure. The crutch height was set three finger-widths below the armpit, with the handgrip positioned to allow approximately 30 degrees of elbow flexion, and the crutch tip placed six inches lateral to his foot.

The patient's progress was monitored at follow-up visits at 6, 9, and 12 weeks. At eight weeks, he began partial weight-bearing with a three-point gait pattern under supervision. By the 12-week follow-up, he had progressed to full weight-bearing with protection. No complications, such as skin abrasions or neurovascular symptoms, were reported. His gait improved, and he reported increased confidence and stride length. His Functional Independence Measure score rose from 115 at the initial assessment to 123 at the final follow-up, indicating a transition from modified independence to complete independence in most activities of daily living, though he remained partially dependent on assistance for more complex tasks. He continued to use crutches for approximately 12 weeks, gradually reducing his reliance as his strength and stability improved.

Figure 1 Patient-made axillary crutch, front and lateral views

Discussion

Pelvic fractures are serious injuries that can lead to long-term complications, including chronic pain and limited mobility [7]. Assistive devices are crucial for recovery, yet their accessibility remains a major challenge in low-resource settings [8]. This case highlights how patient-led innovation can bridge this gap. The patient's improvised axillary crutches exemplify appropriate technology, tailored to his specific needs and local resources.

This approach aligns with the "walking aid kit" proposed by Nickpour and O'Sullivan, which emphasises adaptability and user-centred design [9]. The patient's success was not solely due to the device itself but also to the collaborative relationship between the patient and the healthcare providers. The guidance he received on device design and safety was instrumental in preventing potential complications, such as axillary nerve compression or instability.

Physiatrist-led rehabilitation faces multiple challenges, including limited availability of specialists, resource constraints, fragmented care coordination, and variable access to multidisciplinary services [10]. Although this patient did not have access to a comprehensive team, his ingenuity, together with remote guidance from a physiatrist, proved highly effective. The homemade device was virtually free, constructed from scrap materials, whereas a standard pair of crutches would have cost the equivalent of four to five days' wages for a labourer in his community. Physiatrist-led counselling, exercise instruction, and assistive device training facilitated rapid, cost-effective functional recovery. This experience highlights the importance of integrating rehabilitation into primary healthcare in the community. Training and using local resources can improve access and sustainability, aligning with the WHO Rehabilitation 2030 agenda.

This case report illustrates the potential of patient motivation and ingenuity, combined with basic rehabilitation guidance, to achieve functional recovery in a resource-limited setting. The successful use of a self-made axillary crutch demonstrates the clinical value of context-appropriate, low-cost innovations. Although the lack of advanced imaging, such as computed tomography or magnetic resonance imaging, limited a detailed assessment of the pelvic injury, the positive functional outcome highlights the feasibility of healthcare solutions at the primary care level. This case serves as an example of empowering patients to take an active role in their own health and rehabilitation.

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Author contributions

Manuscript drafting and revising it critically: SC, AI, AT. *Approval of the final version of the manuscript:* SC, AI, AT. *Guarantor accuracy and integrity of the work:* SC, AI, AT.

Conflict of interest

We do not have any conflict of interest.

Data availability statement

We confirm that the data supporting the findings of the study will be shared upon reasonable request.

Supplementary file

None

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