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## Case Report

# “Proximal to distal” sequence of the release of the upper extremity post-burn contracture: Rule or case-based approach?

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## ABSTRACT

Post-burn contractures are common entities seen in developing countries. There are multiple reasons for the development of contractures, most are preventable. In extensive contractures, a strategic plan is necessary to release all contractures and yet not antagonize post-operative positions. It is also necessary to be cost-effective and minimize the number of surgeries needed. Conventionally the release sequence in extensive burn contractures is proximal to distal. In this case report, we discuss an unusual sequence where we released distal contractures before the proximal to achieve optimum results. A 3-year-old child with post-burn contracture of hand, wrist, elbow, and axilla was treated in 2 stages, with the release of wrist contracture and cover with pedicled abdominal flap in the first stage and division of pedicled flap with the release of axilla and elbow contracture in the second stage. Thus, the release of all contractures was achieved without antagonizing post-operative positions and minimized the number of surgeries. A case-based approach may be crucial in making a strategic surgical plan to minimize the rehabilitation phase, rather than following known dictums.

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## Introduction

Prevention is the best strategy for any burn contracture, achieved quite simply with splinting joints in functional position and physiotherapy involving active and passive movement of joints in all ranges of motion.<sup>1</sup> Despite the ostensibly simple measures, post-burn contractures are common in developing countries for multiple reasons.<sup>2</sup> In case of extensive contractures, surgeon needs to make a strategic surgical plan to release all contractures and minimize operative sessions, thus being cost-effective and reducing the adverse effects of anesthetics.<sup>3</sup> Conventionally, the release sequence in extensive burn contractures is from proximal to distal. The proximal joint contractures are released separately and completely before going to the distal joints. It was believed that it is of little value to have a mobile wrist if the shoulder and elbow have a limited range of movement due to severe contracture.

## Case report

We discuss an unusual release sequence in a 3-year-old female child with a history of scald burns 9 months back, coming with post-burn contracture of the left axilla, elbow, wrist, and dorsum of the hand (Fig. 1). In an ideal scenario, she would undergo release of all contractures with resurfacing of the axilla and elbow with local flap and grafting with a microvascular reconstruction of the dorsum of the wrist in one operative session. However, we routinely prefer to do a pedicled flap on hand and wrist contractures in our unit.

She underwent contracture release on the dorsum of the left hand with soft tissue cover with right lateral intercostal artery perforator flap based on 6th and 7th intercostal perforators (Fig. 2). Lateral intercostal artery perforator (LICAP) flap – a pedicled abdominal flap was raised based on the contralateral intercostal perforators. It allowed for comfortable positioning of the hand across the abdomen. The axilla and elbow though involved in the post-burn contracture did not restrict the positioning of the upper limb.

In the second stage, she underwent flap division and axillary and elbow contracture release with a local flap and split skin graft 3 weeks later (Fig. 3). Thus, contracture release and soft tissue cover

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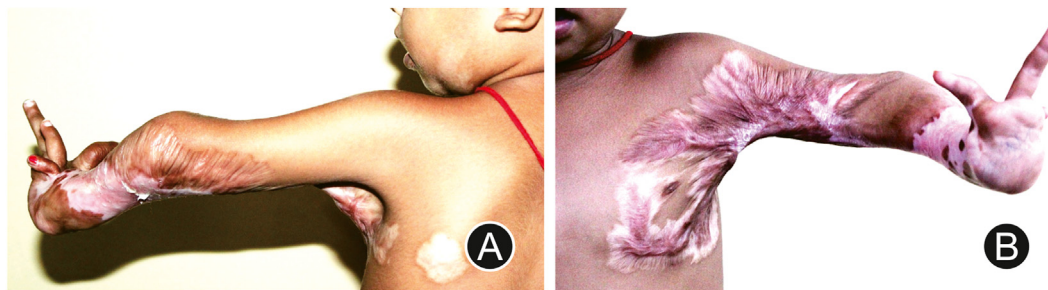


Fig. 1. (A) Pre-operative image (posterior); and (B) pre-operative image (anterior).



Fig. 2. After stage 1 (release of wrist contracture and cover with right lateral intercostal artery perforator flap).

of the axillary, elbow, and wrist were achieved in 2 stages over the 3 weeks.

Release of the axilla and elbow in the first stage would have prolonged her hospital stay and interfered with mandatory post-operative splinting.

**Discussion**

Assessment of any burn contracture involves a detailed history of events and examination, including time since burn injury, the severity of functional limitation, quality of surrounding skin/scar, and involvement of other body parts.<sup>4</sup>

In case of extensive contractures, the surgeon needs to make a strategic surgical plan to release all contractures and minimize operative sessions, thus being cost-effective and reducing the adverse effects of anesthetics.<sup>3</sup> But it is also important to consider post-operative splinting positions after the simultaneous release of

contractures, for example, in the simultaneous release of contractures of the neck and axilla, the two contradicting positions such as neck extension (after neck contracture release) and arm abduction (after axillary release) would be uncomfortable for the patient and also affect the ultimate result.<sup>5</sup>

Conventionally, the release sequence in extensive burn contractures is proximal to the distal. A mobile wrist is of limited value if the shoulder and elbow have a restricted range of movement due to severe contracture. Thus, in a multiple-level contracture of the upper limb, it is assumed that the release of axillary contracture is the starting step before the treatment of concomitant elbow and wrist contracture.<sup>6</sup> However, in our case, though the traditional sequence was not chosen, some forethought on the sequence of events and hand position helped us pick the most reasonable plan for our patient.

Only limited literature is available regarding the sequence of contracture release in the upper extremity. A case-based approach may be crucial in making a strategic surgical plan to minimize the rehabilitation phase. Further studies are warranted concerning the sequence of release in extensive burn contractures.

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**Ethical statement**

This is a case report about a single patient. The institutional review board (IRB) of Christian Medical College has confirmed that no ethical approval is required. The patient reported in this communication has consented to submit the report to the journal.



Fig. 3. After stage 2 (flap division and release of axillary and elbow contractures).

### Declaration of competing interest

The authors declare that they have no conflict of interest.

### Author contributions

Geley Ete and Shwetha Agarwal were the operating surgeons. Kingsly Paul M conceptualised the manuscript. Priyadarshini A compiled data and wrote the manuscript. All authors read and approved the final version of the manuscript.

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