

## Case Series

# Early debridement with physiotherapy for prevention of postburn contracture of neck: a case series

Girish D. Bakhshi, Aditya B. Marathe\*, Chirag Kamat, Khadeija Hussain

Department of General Surgery, Grant Medical College and Sir JJ Group of Government Hospitals, Mumbai, Maharashtra, India

**Received:** 12 February 2020

**Accepted:** 06 April 2020

**\*Correspondence:**

Dr. Aditya B. Marathe,

E-mail: [marathe.aditya9@gmail.com](mailto:marathe.aditya9@gmail.com)

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### ABSTRACT

Hypertrophic scars and contractures are well known sequelae after burns. They result in high morbidity in severely burned patients who are surviving. Present case study was done to establish the usefulness of early debridement and physiotherapy in preventing these sequelae. Present study was conducted on patients admitted in a tertiary care hospital on patients with alleged history of thermal burns to neck and upper chest over a period of 6 months. These patients were subjected to early debridement, daily dressings and early neck physiotherapy. They were assessed for neck mobility and development of neck contracture. Three patients were studied, two had a favourable outcome due to adherence to above measures while one developed contracture due to her late presentation and non-compliance to early physiotherapy. Post burn contractures are common sequelae of thermal burns involving the neck region. Early Debridement, daily dressing of the raw areas with starting of early neck physiotherapy are important and prove beneficial in preventing neck contractures with early return to normal daily activity.

**Keywords:** Neck burns, Post burn contractures, Physiotherapy, Rehabilitation

## INTRODUCTION

Burn injuries form a major burden of accidental injuries in the world majority of which occur in developing world. An extensive burn can be the most devastating injury an individual can sustain with potential sequelae like post burn scars or contractures which make it difficult for the individual to restore to his normal social life as before. Post burn contractures, though preventable, prove to be a common scenario in case of burn patients in spite of the developments in burn management, thus emphasizing a major role of active patient participation in rehabilitation including physiotherapy immediately after the incident, to restore maximum functionality of the affected part.<sup>1</sup>

## CASE SERIES

### Cases 1

A 32-year-old male was brought to our institute referred from other health centre with alleged history of stove blast at his home 2 days back sustaining flame burns over face, neck and anterior chest. He was then taken to a local hospital where he was managed conservatively and referred to another higher centre from where he was referred to our institute.

Patient was admitted and vitals monitored. Intravenous access was established and resuscitated according to Parklands formula.

On examination, patient was found to be conscious, oriented and stable vitally with 15-20% superficial to deep burns involving the lower face, anterior neck, upper half of chest and proximal one third of right upper limb anteriorly (Figure 1a).



**Figure 1: Case 1 (a) on admission, (b) after one week, (c) after 2 weeks, (d) after 3 weeks, (e) after 6 weeks, (f) after discharge.**

Patient was then managed with daily dressing with Silver sulfadiazine cream locally over neck, chest and right upper limb and Framycetin cream over face after the patient having a thorough burn bath. Patient was taught active neck physiotherapy and advised strict adherence to the same. The ulcer gradually developed an eschar over one week which was debrided (Figure 1b and c).

Patient was also transfused blood during his stay to correct anaemia. After a period of about 3 weeks, the ulcer was found to be healthy and was dressed daily with normal saline and non-adhesive paraffin gauzes (Figure 1d).

The patient was also started on i.v. antibiotics during this period according to the wound swab culture reports with monitoring of haemoglobin level and counts. Patient was on high protein diet during all this period. It was ensured by the attending residents on daily rounds that the patient performed adequate neck exercises as advised.

Eventually, the ulcer was found to be healthy with initiation of re-epithelialization. Patient continued the active neck exercises all through his stay in ward and thus did not have any evidence of contracture of neck at the time of discharge (Figure 1e and f).

## Case 2

A 35 year old male was brought to our institute with alleged history of assault over his head with blunt object followed by throwing of hot water on his body about 6 hours back, sustaining multiple contused lacerated wounds (CLWs) over scalp and burns over face, neck and upper half of chest. Patient was admitted and vitals monitored. Intravenous access was established in femoral vein and patient was resuscitated according to Parklands formula.

On examination, patient was found to be conscious, oriented with a Glasgow coma scale of 15/15 with bilaterally equal and reactive pupils with a saturation of 98% on room air. Patient was found to have 12 CLWs involving the frontal, parietal and occipital region of scalp with no palpable underlying skull fracture and no evidence of any chest, abdomen or limb injury, with 30-35% superficial to deep burns involving the face, anterior neck, upper half of chest and proximal one half of left upper limb anteriorly up to the elbow (Figure 2a and b).

The CLWs were sutured primarily with non-absorbable sutures and sterile dressing given. The burnt area was cleaned with savlon wash and overlying dead skin debrided and was dressed with silver sulfadiazine cream locally over neck, chest and left upper limb and Framycetin cream over face.

CT brain plain of patient was done and was found to have comminuted undisplaced fractures of bilateral parietal bone with subgaleal haematomas with comminuted displaced fractures of anterior and posterior walls of right maxillary sinus and lateral wall of right orbit and left zygomatic bone with no underlying brain parenchymal injury. Ultrasound of abdomen and thorax was normal.

Patient was then attended by the neurosurgeon and plastic surgeon and was advised no active intervention for the skull and facial fractures and to continue with conservative line of management. Patient was also attended by Ophthalmologist for bilateral eyelid swelling and orbital fracture and was advised antibiotic and analgesic eye drops with cold compression for local application.

Patient was then managed with daily dressing with Silver sulfadiazine cream locally over neck, chest and right upper limb and Framycetin cream over face after the patient having a thorough burn bath. Patient was taught active neck physiotherapy and advised strict adherence to the same. Facial and periorbital oedema settled gradually over a period of one week and eventually the scalp sutures were also removed (Figure 2c-e).

After a period of about 2weeks, the ulcer was found to be healthy and was dressed daily with normal saline and non-adhesive paraffin gauzes. The patient was also started on i.v. antibiotics during this period according to

the wound swab culture reports with monitoring of haemoglobin level and counts. Patient was on high protein diet during all this period. Also, the resident doctors on their round ensured that the patient performs adequate neck physiotherapy (Figure 2f).

Eventually, the ulcer was found to be healthy with initiation of re-epithelialization. Patient continued the active neck exercises all through his stay in ward and thus did not had any evidence of contracture of neck at the time of discharge (Figure 2g).



**Figure 2: Case 2 (a and b) on admission, (c-e) after one week, (f) after 2 week, (g) on discharge.**

### Case 3

A 40 year old female was brought to our institute with alleged history of flame burns due to stove blast at her home about one and half months back sustaining burn injury over lower face, anterior neck and entire anterior part of the torso. Patient was managed at another civil hospital conservatively with daily dressing and patient was referred to our institute for further management. On examination, patient was found to be conscious, oriented and stable vitally. She was found to have 20-25% superficial to deep burns involving lower jaw, anterior neck and anterior aspect of entire torso with raw area involving upper chest and rest area being epithelialized. Patient was found to have contracture of the neck with flexion attitude of head and she was unable to extend or rotate her head completely (Figure 3a and 3b).

On retrospective enquiry, it was found that patient was not counselled about the early active neck physiotherapy and she was not compliant to the same following which she developed the contracture limiting her head movements (Figure 3c). All throughout her stay in the ward, she was taught active neck physiotherapy and was also motivated for the same. However, due to her non-compliance to the physiotherapy her deformity persisted and patient was transferred to Plastic surgeons for further management (Figure 3d).



**Figure 3: Case 3 (a and b) on admission, (c) after one week, (d) at transfer.**

## DISCUSSION

The head and neck region are the most commonly affected regions in burns involving the upper half of the body due to their continuous exposure to the exterior. It is also the most aesthetic and functional region in case of such patients. The natural neck position makes the head in the most optimal alignment for daily interactions. Unlike other joints, which are normally in maximal extension (e.g., the knee), the neck is in a neutral contracted position during standing. Due to the wrong position of the head on the neck during burn management and the pillow under the head not the shoulder, the chronic flexion contracture is often seen in deep extensive burns of the neck and this may be attributed to the flexion position taken by the patient to minimize the tension on the neck and hence decreasing the pain sensation.<sup>1</sup>

Contractures and hypertrophic scars are two frustrating sequels of thermal injury. Scars of the anterior cervical region are prone to be unusually severe because:

- Its skin is rather loose, thin and thus easily destroyed.
- The area from chin to the sternum is a concave flexor surface.
- The extreme mobility of the neck makes it prone to contracture formation.
- Vertical incisions in the skin of the anterior cervical area, whether accidental or surgical, are likely to result in contracted scar bands.<sup>1</sup>

It is important to understand the concept of wound healing in burns not only for management but also prevention and minimisation of post burn neck contractures.<sup>2</sup>

The process of healing in burns occurs by either restitution or substitution. Restitution involves complete epithelialisation of the burnt surface area by specialised cells derived from the stratum basale layer of the epidermis. This occurs when the depth of the burn is limited to papillary layer of the dermis and epithelialisation taking place from specialised cells from pilosebaceous units and sweat glands in the centre and wound edges at the periphery.<sup>3</sup> In substitution, the defect of the burn area is covered by substitutive unspecialised connective tissue. This is seen in cases where the burn extends deep up to the reticular layer of the dermis resulting in extensive development of the scar by contraction.<sup>3</sup>

Ideally, contractures should be prevented by nursing the patient with a neck extension in the acute phase and wearing a cervical collar during the subacute phase of wound healing. Exercises form an integral part of post burn rehabilitation and should be started right from the day of admission in hospital. The rehabilitation of patients with burns is a continuum of active therapy, and

an exercise program is generally started at admission.<sup>4</sup> Exercise of patients with burn injury consists of two primary modes, range of motion (ROM) and conditioning exercises, which include functional activities. Initial emphasis is placed on preserving mobility and function and preventing loss of motion through positioning, splinting, and exercise.<sup>4</sup> The benefits of exercise programs in restoration of function are well accepted; however, the optimal content of these programs is lacking but guidelines for standard burn exercise programs with defined exercise parameters and outcome measurements are needed.<sup>4</sup>

The patients, however, fail to show compliance to this protocol due to extensive raw areas of the wounds and most importantly severe pain that occurs on movements. Hence, in order to achieve desired movements and ensure compliance of the patient to neck physiotherapy, adequate analgesia is of prime importance. The aim of this pain control is to allow the patient to do his daily activities with good baseline pain control, ultimately preventing contracture in future.<sup>5</sup> Persistent and often repetitive education of the patient and relatives is of prime importance. The habit of engaging the patient in daily repetitive mobility exercises of the neck and encouraging him to take responsibility of self exercises and daily activities makes half the work done.<sup>5</sup> If there is suspected muscular or tendon injury or nerve injury, protected movements with resting splints are necessary.<sup>5</sup> The functional outcome is definitely compromised if the patient fails to regularly engage in movements.

In this case series, it was observed that along with early resuscitation of a head and neck burn patient, his daily wound care supplemented by active neck exercises is very important to prevent the future dreadful complication of neck contracture which limits their daily functionality. It was seen that two of our patients who were counselled early and adhered to the early active neck physiotherapy exercises did not develop any significant contracture of neck at time of their discharge whereas one of them who already had developed the contracture due to her failure to initiate early physiotherapy was later on subjected to reconstructive procedures by plastic surgeons. Initially, patients were reluctant to perform the neck exercises due to severe pain. However, gradually they were started with the exercises under cover of analgesics initially. The exercises were in the form of neck flexion, extension, rotation and lateral flexion. The range of motion which was initially restricted, improved gradually over a period of time and thus prevented the development of any contractures.

## CONCLUSION

After studying these cases, we come to the conclusion that burn injuries involving the neck and anterior chest are very commonly encountered and are mostly result of accidents. Following these injuries, early resuscitation

with daily cleaning and dressing of the wound with early debridement helps in faster recovery but equally and even more important are early active neck physiotherapy exercises which are essential to prevent the dreaded complication of neck contracture which severely restrict the mobility and add to the disability of the individual subjecting them further to another major stress of reconstructive procedures which adds to their financial burden.

Hence, it is important that the head and neck burns patient when attended by the general surgeons should receive a holistic approach for the management of the wounds with emphasis on early neck exercises and ensuring patients compliance to them. Further, it should be understood that rehabilitation of burns patient is a continuum of events and starts from time of admission. Education of the patients and relatives is of paramount importance to make them take responsibility of their own rehabilitation and avoid post burn sequelae.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: Not required*

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**Cite this article as:** Bakhshi GD, Marathe AB, Kamat C, Hussain K. Early debridement with physiotherapy for prevention of postburn contracture of neck: a case series. Int Surg J 2020;7:1618-22.