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Clinical practice recommendations for positioning of the burn patient

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ABSTRACT

The objective of this review was to systematically examine whether there is clinical evidence to support recommendations for positioning patients with acute burn. Review of the literature revealed minimal evidence-based practice regarding the positioning of burn patients in the acute and intermediate phases of recovery. This manuscript describes recommendations based on the limited evidence found in the literature as well as the expert opinion of burn rehabilitation specialists. These positioning recommendations are designed to guide those rehabilitation professionals who treat burn survivors during their acute hospitalization and are intended to assist in the understanding and development of effective positioning regimens.

1. Introduction

Patients who are admitted to a burn center with significant burns should be positioned in what has been documented in the literature as the 'anti-deformity' position [1]. The body area affected by the burn should be positioned opposite the direction of potential burn scar contracture. Contractile forces after burn tend to draw the body into a fetal position which is sometimes described as the position of comfort. If maintained throughout healing, this position of comfort can lead to fixed deformity. Traditionally, patient positioning is implemented upon patient at the burn center and is continued along the continuum of care as needed to prevent scar contracture and deformity. Patients who sustain deep partial thickness and full thickness burns are at highest risk for developing contractures [2]. A positioning program is typically designed based on individual patient needs and altered as the patient's medical status dictates. Postoperatively, positioning/immobilization of skin grafted areas is implemented according to physicians' orders and is continued per the specific burn center protocol. The development and implementation of positioning programs are a core component of a burn therapist's job responsibility. Such programs aim to decrease edema, maintain joint alignment while the patient is immobilized, promote wound healing, relieve pressure, protect new skin grafts/flaps, and prevent contractures [3–7]. Richard et al. [8] stress the importance of the burn team working together along with the patient's family to construct a comprehensive positioning program that is applied along the continuum of burn rehabilitation and begins upon the patient's admission to the burn center. The positioning recommendations described

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in this manuscript are intended to provide suggestions on how burn rehabilitation specialists can approach the subject of positioning and may be altered by individual burn centers depending on their needs and resources.

2. Recommendation

Burn rehabilitation emphasizes the importance of mobility and function, however there are times during recovery that periods of immobility are needed to protect vulnerable areas or mitigate the formation of scar contractures. During these times, the following are positioning recommendations:

- **Head:** the head should be positioned above the level of the heart.
- **Neck:** the neck should be positioned in the midline (no rotation or side bend) between neutral (0°) and 15° extension.
- **Shoulder:** the shoulder should be positioned in about 90° abduction and 15–20° horizontal flexion.
- **Elbow:** the elbow should be positioned in extension. Care should be given not to lock the elbow in full extension (about 5–10° from full extension) in order to prevent further joint trauma.
- **Forearm:** the forearm should be positioned in neutral (zero degrees) or in about 10° supination.
- **Wrist:** the wrist should be positioned in neutral to about 10–15° extension.
- **Hand:** the metacarpophalangeal (MCP) joints of digits 2–5 should be positioned in about 70–90 flexion, the interphalangeal (IP) joints should be positioned in full extension. The thumb should be positioned in a combination of palmar and radial abduction at the carpometacarpal (CMC) with the MCP and IP joints in full extension.
- **Hip:** the hip should be positioned in neutral (zero degrees), no rotation and approximately 10–15° abduction.
- **Knee:** the knee should be positioned in extension. Care should be given not to lock the knee in full extension (about 3–5° from full extension) in order to prevent joint capsular tightness.
- **Foot and Ankle:** the foot and ankle should be positioned in the neutral position (zero degrees plantarflexion/dorsiflexion flexion and zero degrees inversion/eversion).

3. Literature review process

A literature search was conducted online through the National Center for Biotechnology Information (NCBI) at the National Library of Medicine (NLM). The search included the words ''burn,'' ''rehabilitation'' and ''positioning'' with filters set from 1995/01/01 to 2015/01/31. Fifty six citations were displayed in PubMed and indexed for MEDLINE. Of the 56 publications revealed, 31 were found to be irrelevant to the subject of patient positioning. Twenty-five publications were deemed appropriate for full review. All publications were systematically reviewed and scored utilizing the critical appraisal form designed by Law et al. [9]. The scoring of the selected publications was based on the study purpose, literature review, study sample, outcomes, interventions, results, conclusions and clinical implications. Each item on the critical appraisal form was given a score of ''1'' for a yes and score of ''0'' for a no. Of the 25 publications reviewed one was a randomized control trial [10], one was a single case design [11], one was a prospective interventional study [12], one was a prospective data collection [2], three were surveys [13–15], three were retrospective chart reviews [7,16,17] and fifteen were considered to be expert opinion articles (Table 1) [18–32]. The literature was lacking evidence-based studies, therefore additional publications regarding patient positioning were considered in establishing these recommendations.

4. Results – discussion on positioning recommendations

4.1. *Head*

Facial edema is evident acutely as a result of a severe burn involving the head of the patient. To relieve excessive facial edema, the patient's head should be positioned above the level of the heart. This can be accomplished by elevating the head of the patient's bed or by inclining the patient's bed as a unit to approximately 30–45° [4]. Today, modern beds can accomplish this positioning through the electronics/hydraulics located within the bed (Fig. 1a). In resource limited countries of the world, these modern beds may not be available however the position described above may be accomplished with the use of square wooden blocks (wooden blocks measuring about 12–16 in.) secured under the bed legs at the head of the bed [4]. In the cases where the patient's hips are severely affected by the burn the head of the patient should be positioned in the desired position by elevating the bed as a unit (this position is known as the reverse Trendelenburg position) in order to avoid hip flexion position that may occur if only the head of the bed is elevated to 30–45°. The head of the patient should rest directly on the bed mattress without any bulky hospital dressings as they may potentially cause unwanted pressure in the occipital region. Pressure relief gel cushions may be utilized under the head to prevent pressure sores on the occiput as indicated; however, care should be taken to frequently reposition the head to prevent pressure ulcers and maintain neck neutral. Elevating the head may result in neck flexion due to the forces of gravity, therefore care should be taken to maintain the neck position described below. Deep burn to the face may cause mouth tightness which may later lead to microstomia if not addressed early by the burn therapist. Horizontal, vertical or circumferential mouth opening orthotics may be used to maintain the normal architecture and mechanics of the mouth [4].

4.2. *Neck*

The patient's neck should be positioned in neutral or in slight extension of about 10–15° avoiding any rotation or lateral flexion [4–6]. Care should be taken not to overextend the neck in cases of patient intubation (Fig. 1b). This position can be achieved through placing rolled towels inferior to the neck horizontally along the scapular line or vertically along the spine [4,5]. A shorter foam mattresses or crib mattress