Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/burns

Case report

Intensive swallowing and orofacial contracture rehabilitation after severe burn: A pilot study and literature review

Nicola A. Clayton [a,b,c,*], Elizabeth C. Ward [c,d], Peter K. Maitz [b]

[a] Speech Pathology Department, Building 42, Hospital Rd, Concord Repatriation General Hospital, Sydney, NSW 2139, Australia
[b] Burns Unit, Level 7 North, Hospital Rd, Concord Repatriation General Hospital, Sydney, NSW 2139, Australia
[c] School of Health & Rehabilitation Sciences, The University of Queensland, QLD 4072, Australia
[d] Centre for Functioning and Health Research, Metro South Hospital and Health Service, QLD 4102, Australia

ARTICLE INFO

Article history:
Accepted 14 July 2016

Keywords:
Burn
Swallowing
Orofacial contractures
Rehabilitation
Outcomes

ABSTRACT

Background: Dysphagia following severe burns can be significant and protracted, yet there is little evidence describing the rehabilitation principles, process or outcomes.
Purpose: Outline current evidence and detail the clinical outcomes of two cases who underwent a multifaceted intensive treatment programme aimed at rehabilitating dysphagia by strengthening swallow function and minimising orofacial contractures after severe head and neck burns.
Methods: Two men (54 and 18 years) with full-thickness head and neck burns and inhalation injury underwent intensive orofacial scar management and dysphagia rehabilitation. Therapy was prescribed, consisting of scar stretching, splinting and pharyngeal swallow tasks. Horizontal and vertical range of movement (HROM; VROM), physiological swallow features, functional swallowing outcomes and related distress, were collected at baseline and routinely until dysphagia resolution and scar stabilisation.
Results: At presentation, both cases demonstrated severely reduced HROM and VROM, profound dysphagia and moderate dysphagia related distress. Therapy adherence was high. Resolution of dysphagia to full oral diet, nil physiological swallowing impairment, and nil dysphagia related distress was achieved by 222 and 77 days post injury respectively. VROM and HROM achieved normal range by 237 and 204 days.
Conclusion: Active rehabilitation achieved full functional outcomes for swallowing and orofacial range of movement. A protracted duration of therapy can be anticipated in this complex population.

* *Corresponding author at*: Speech Pathology Department – Building 42, Hospital Rd, Concord Repatriation General Hospital, NSW 2139, Australia.
E-mail address: nicola.clayton@sswahs.nsw.gov.au (N.A. Clayton).
http://dx.doi.org/10.1016/j.burns.2016.07.006
0305-4179/

1. Introduction

Dysphagia, characterised by impairments in both the oral and pharyngeal stages of the swallow [1–8], is a potential negative consequence of severe burn. Early prevalence data indicates that 11% of patients hospitalised for thermal burn will experience dysphagia [9], with the risk of dysphagia increasing with severity of the injury [5,9]. Several authors have proposed that the presence of intra-oral, facial and/or neck burn, inhalation or ingestion injury, tracheostomy, intubation periods of greater than 48 h, concomitant neurological injury, severe sepsis, advanced age and significant co-morbidities may all increase the risk of a patient developing dysphagia [1,2,10–16]. Burn patients with larger size endotracheal tubes have also been found to demonstrate poorer outcomes on voice and swallowing assessment [1]. In a series of studies, Rumbach and colleagues [9,17] validated a core set of features including increasing age, >18% total body surface area (TBSA) burn, need for escharotomy, head and neck burns, inhalation injury, intensive care admission, and mechanical ventilation as clinical predictors of dysphagia post thermal burn. While most patients demonstrate swallowing recovery early within their admission [7], literature supports that a proportion of patients, typically those with more extensive injury and increasing %TBSA burns, will experience chronic dysphagia with a protracted recovery [5–7,13,15].

Dysphagia is a symptom of an underlying pathology resulting from a diversity of causes including neurological, structural or traumatic origin. Within the thermal burns population, it is recognised that the aetiology of dysphagia is multifactorial, initiating from the mucosal tissue trauma created by the thermal burn. In particular, restricted mouth opening and impaired lip seal impacting on oral stage swallowing function are a common consequence of orofacial burns [6,18,19]. Recent data from patients with partial [20] and full thickness [21] orofacial burn, documents the presence of significantly restricted vertical and horizontal mouth opening at initial presentation compared to normative data, with associated functional impacts to oromotor function. Laryngo-tracheal oedema in the presence of inhalation injury [7] may also impact on the structural integrity of the pharynx and larynx, and their sensorimotor function during the pharyngeal stage of the swallow.

In addition to the potential loss of structural integrity created by tissue injury and scarring, there are also potential neurological changes leading to altered sensorimotor control of the swallow. Sensory changes, in response to direct tissue damage, contribute to early odynophagia [3,19]. Impaired laryngopharyngeal sensation due to early oedema and later tissue scarring is also a common feature [6,7,22], contributing to observed delays in swallow initiation [2,6,7,23] as well as undetected pharyngeal residue and increased risk of silent aspiration [7,22]. Furthermore, impairments in motor function may also result from de-conditioning and fatigue, associated with long periods of critical care and protracted recovery following severe burns. In the presence of de-conditioning and general motor weakness, patients may present with poor secretion management [6,7,22]; inadequate movement of the pharyngeal and laryngeal structures [7,22]; base of tongue and hypopharyngeal weakness [22], and demonstrate diffuse pharyngeal residue post swallow [6,7,22]. Specifically related to the swallowing process, inadequate movement of laryngeal and pharyngeal structures in conjunction with tongue base and pharyngeal hypo-tonicity, manifest as impaired airway closure, reduced propulsion of food and fluid through the pharynx and reduced clearance of food and fluid residue from the pharyngeal recesses. This subsequently raises the risk of aspiration both during and after the swallow.

Whilst there is some description in the literature regarding the nature and potential pattern of recovery of dysphagia following severe thermal burn, there has been limited specific discussion of dysphagia rehabilitation practices and their outcomes in this population. To date, the evidence relating specifically to the rehabilitation of dysphagia in the thermal burns population comes from only three single case studies. Unfortunately, across these three studies there are differences in the nature and extent of the thermal burn, there are a diverse range of therapeutic strategies used, and the timing and frequency of rehabilitation is often poorly explained.

In the very first case study reported, Clayton and Kennedy [19] describe a 31 year old women with firecracker induced thermal burn to the lips and oral cavity who exhibited oral dysphagia, characterised by poor mouth opening, reduced lip seal and odynophagia. The patient was also deemed to be at high risk for oral contractures. Treatment consisted of compensatory management involving dietary modification and topical pain relief for odynophagia while an exercise and splinting regime was implemented to prevent oral contractures. No reference was made to using any specific swallowing rehabilitation strategies. Exercises to prevent orofacial contractures were reportedly prescribed five times daily, however the number of repetitions were not specified. The splinting regime was conducted for a one hour period, twice daily. The patient achieved premorbid swallowing function and full functional mouth range of movement with a treatment duration of 71 days.

Two years following this initial case report, Rumbach et al. [6] described the rehabilitation of a 60 year old man with 53.5%TBSA thermal burn including the head and neck. He presented with severe oral and pharyngeal dysphagia, further complicated by the presence of a tracheostomy tube and full thickness wounds to the face undergoing grafting. In this case report, rehabilitation involved the use of a tracheostomy speaking valve to facilitate secretion management and restore laryngeal sensation. In addition, the authors describe using active swallowing rehabilitation exercises including laryngeal adduction and range of movement exercises to rehabilitate airway closure, and the effortful swallow technique to improve pharyngeal muscle strength. Orofacial contracture management was also a component of the rehabilitation plan. A dynamic mouth splint, range of movement exercises and z-plasties to the oral commissures were utilised to treat the patient's microstomia. Unfortunately the case report did not detail the frequency or daily repetitions of exercises which were completed. Whilst the authors report that the patient achieved a modified oral diet with ongoing enteral supplementation at Day 188, the actual duration of treatment was not specified as therapy was ongoing.