

# Burns of the head and neck – from physiological to psychological impact

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## ABSTRACT

Burn injuries have a long-term negative impact on patients, families, and healthcare systems, and prevention remains the primary goal. Head and neck lesions have a reported prevalence between 6-65.6%, sometimes even 95.1%. There are various risk factors and predictors of facial burns, like younger age, male sex, flame or flash burns, and work-related injuries. Surgical and non-surgical management is chosen depending on the burn type and extension, and the patients' previous health status. Tangential necrosectomy is the gold standard of third-degree burn care. In the last years, enzymatic debridement showed promising results. Long-term complications, from altered sensibility, and face motor dysfunction, to hypertrophic scarring and mutilating aspects, frequently lead to depression, post-traumatic stress disorders, and social exclusion. To improve patients' quality of life, various programs targeting reconstructive surgeries with cosmetic purposes, social skill training, and cognitive behavioural therapies should be implemented.

**Keywords:** head burns, neck burns, severe contracture, disfigurement, tangential necrosectomy, impaired quality of life, PTSD

## INTRODUCTION

According to World Health Organization reports, burns are a major health problem, especially in low- and middle-income countries, being responsible for more than 180.000 deaths annually [1]. Recent research, targeting 204 countries and regions, presented that in 2019, there were about 8.378.112 new cases of burns globally, with 111.292 deaths, especially in children between 1-4 years old. The burden of burns for 2019, assessed using disability-adjusted life years (DALYs), was 7.460.448,65 [2].

Reports show a prevalence of burns in the neck and head areas varying from 6-60% [3-5], to 65.6% [6] or even 95.1% [7], being one of the commonest sites of injury, affecting especially the male gender. Facial burns are frequently seen [3-5]. Usually, burn injuries appear secondary to an accident, occupational activities, self-aggression, or assault, through the direct action of heat, electricity, friction, radiation, or chemicals [2,3,7]. It is well known that burn injuries have immediate and long-term repercus-

sions on patients, families, societies, and healthcare systems [8,9].

The main purpose is to prevent burn lesions appearance, through proper public health policies and promoting personal protective equipment (PPE) usage [10]. Afterward, prevention of progression, ensuring survival, and limiting long-term complications guide patient's management [11]. There are various identified predictors and risk factors for facial burns appearance, presented in Figure 1 [3,6,12].

## Head and neck burns during the COVID-19 pandemic

As already known, COVID-19 (the coronavirus disease-19) pandemic produced drastic social changes, starting with "stay at home" policies, which increased the unemployment rates and continuing with social distancing and restrictions [13]. There was a decrease in burn cases at the begging of the pandemic [14], afterwards, the admission returned to pre-pandemic values [15].



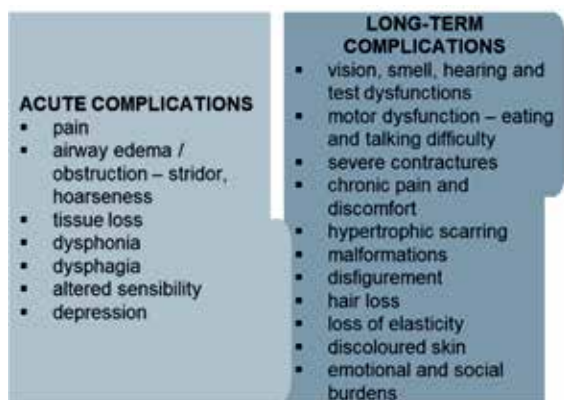
**FIGURE 1.** Frequent predictors of facial burns

Amin et al. reported an increased incidence of firearm injuries to the head and neck during the COVID-19 pandemic, associated with alcohol consumption [13]. Another study, targeting head and neck burns during pandemic, showed that even though there was an increase in the number of cases in the first March of the pandemic, overall prevalence was the same as the pre-pandemic period [16].

**The impact of head and neck burns**

Burn injuries led not only to acute systemic derangements and pain but to long-term sequelae affecting mental health and the patient’s quality of life, with burn survivors being considered a vulnerable group [17]. Facial burns presence is associated with post-traumatic stress disorder development (PTSD), self-image, and personal social interaction problems [6,18]. Daily screening for promptly identifying depressive symptoms is very important [3].

In Figure 2 are presented the main acute and long-term complications of burns affecting the head and neck regions, which can be divided into functional and cosmetic categories [10,19-23]. A recent study, by Haddadi et al., reported some possible systemic complications that patients with neck and head burns are predisposed to, like acute respiratory distress syndrome (ARDS), pneumonia, and an increased risk of death [24].



**FIGURE 2.** Acute and long-term complications of head and neck burns

Scar tissue formation, secondary to third-degree burns, in the neck and head region can lead to severe contractures and deformities which need reconstructive surgical procedures, affecting not only the patient’s psychological well-being but also the quality of their social and emotional life [23]. The quality of life (QoL), including physical, emotional, cognitive, and behavioural aspects, are profoundly influenced by burns, especially in young people and women, and rapid and proper care is of paramount importance to obtain the best results [25,26]. Acute management will influence the scarring development and the need for reconstructive interventions [11]. In daily practice, recommendations are to use a proper score system to assess QoL in patients dealing with face and neck burns, like the Burn-Specific Health Scale for Face and Neck (BSHS-FN) [26]. Also, due to the high-risk of orofacial myofunctional disorders, patients with pathological scars on the head and neck should be immediately assessed [27].

Sinha et al. published a study on long-term patient-reported dissatisfaction with their appearance after head and neck burns, and they concluded that the physical health, the degree of life satisfaction, and the percentage of community integration are the same as for patients with burns not affecting these areas. However, the degree of satisfaction in accordance with the physical aspect was lower. Authors concluded that there is a constant need to improve this aspect to improve patients’ QoL, through reconstructive surgeries with cosmetic purpose, social skill training, and cognitive behavioural therapies [28]. It appears that for patients with facial injuries, social function is limited by their appearance, with a negative impact on emotional and sexual functions [29].

Various sequela, especially limitation of mouth opening or incomplete occlusion, incompetent lips, and movement restrictions due to joint contractures, influence not only usual actions like speaking, eating, swallowing but also oral hygiene [1, 30]. A study from Pakistan targeted the oral health-related quality of life (OHRQoL) for patients with facial burn injuries and showed that the severity of resulted facial deformity, along with the dental caries presence, and previous oral health behaviour influences the outcome [31].

**Head and neck burn surgical and non-surgical management**

Third-degree burns of the head and neck areas consist of necrotic tissues adherent to the wound bed, so-called eschar, associated with acute and chronic complications, especially wound infection and mutilating hypertrophic scar (HTS) formation. Eschar removal remains the gold standard for these cases, through tangential necrosectomy (surgical),

an invasive method leading to important blood loss, or enzymatic debridement - enzymatic necrolysis (non-surgical), a less invasive method [32-34]. Tangential necrosectomy can sometimes be difficult to be performed on the head and neck areas. In terms of long-term scar function or quality, the two methods show similar results [31]. The enzymatic necrolysis should be performed within 72 hours after the incident, and it often induces moderate-to-severe pain, requiring proper multimodal analgesia management [34].

Coverage and surgical reconstruction of the affected areas include skin grafts, tissue expansion techniques, and flaps, leading to prolonged hospitalisation [35, 36]. First-degree burns usually heal without surgery, and without further complications. Second-degree burns heal within days to weeks and can lead to moderate scarring. In contrast, third-degree burns require surgical management with reconstructive techniques, associated with important scarring and hyperpigmentation [2,22,37]. Cubison et al. reported that, if a burn lesion heals before 21 days, the risk of HTS is minimum, and surgical interventions should be reversed for burns failing to heal during this period [37].

For scar mitigation, tapes, silicone sheets, hyaluronic acid-based dressings, polymers, or other gel formulations are used to cover the affected areas [38, 39]. Silver-based compounds and dressings, or the use of antimicrobial agents (bacitracin, polymyxin) have inconstant results in obtaining less scar tissue [40]. For the head and neck area, silver-containing dressing has limited utility regarding their adverse effects on eye, nose, and mouth mucosal membranes [41]. Other studies showed the usefulness of topical usage of growth factors and cytokines in burn wound healing because of their ca-

pability of stimulating angiogenesis and extracellular matrix production [42,43]. The polymeric membrane dressing mask, for second-degree burns, shows promising results in terms of pain release and creating a proper healing environment [44].

There are some options for the reconstructive phase of head and neck burn management, like steroids (reduces scar induration and pruritus) [45], laser therapy (585 nm wavelength) [46], or fat grafting [47]. Topical agents can be used during acute or rehabilitation phases. It appears that silicone sheets can prevent contracture by softening the scars, therefore increasing skin and joint mobility [40].

## CONCLUSION

Burns are a major health problem, associating a high mortality and morbidity risk. Patients with head and neck burns are at high risk of hypertrophic scarring in the presence of third-degree burns. Facial injuries presence is associated with post-traumatic stress disorder development, low self-esteem, and personal social interaction problems. Tangential necrosectomy remains the gold standard in patients presenting with severe burns, followed by skin grafting, tissue expansion techniques, or flap usage to cover the skin and tissue defects. Non-surgical intervention can be achieved in the first 72 hours through enzymatic debridement. Other therapeutic options include silver-based compounds and dressings, or topical antibiotic use has inconstant results in obtaining less scar tissue. Topical usage of growth factors and cytokines in burn wound healing shows promising results. In patients presenting with severe head and neck burns, daily screening of depression is required, as well as social skill training, and cognitive behavioural therapies.

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