Introduction

Long artificial (acrylic) nails are a current fashion trend, and are becoming an increasingly popular cosmetic enhancement. We believe that they can be a potential burn hazard to their unknowing users. We present a case report of a significant flame burn from an acrylic (ethyl and methyl-cyanoacrylates) nail, and discuss our review of the available literature regarding the flammability of artificial nails and the adhesive glue used to apply them.

Case study

A 64-year-old woman had acrylic nails applied at a beauty salon, five weeks prior to presenting to the Welsh Burns Centre with full thickness burn to the dorsal side of her thumb. The burn extended from the dorsal tip to the distal intrapharyngeal joint (Fig. 1).

Fig. 1 - View of full thickness burn dorsal, left thumb - pre-operative (left). Overall view of the left hand with visible burn on left dorsal thumb pre-operative (right).

SUMMARY. Having long artificial (acrylic) nails is a current fashion trend, and they are becoming an increasingly popular cosmetic enhancement. We believe that they can be a potential burn hazard to their unknowing users. We present the first reported case in medical literature of a woman whose acrylic nail ignited from a cigarette butt a short distance from the nail while she was taking the final puffs. She sustained a full thickness burn to her dominant left thumb, resulting in terminalisation. Acrylic nails are very flammable and, once ignited, they burn to completion, with the source of flame removed. The temperature at the end of a cigarette can reach 900°C when the smoker takes a puff, which would explain why the artificial nail in our case study ignited. The flammability hazard of artificial fingernails is apparently well known in the beautician community. There are multiple beauty websites and blogs raising awareness of the danger of synthetic nails catching fire. We feel this potential risk should be further highlighted to the public.

Keywords: acrylic, synthetic nails, methyl-cyanoacrylates, flammable, nail glue, nail adhesive
She had been smoking a cigarette with her left dominant hand. Whilst taking the final puffs, the acrylic nail on her thumb suddenly caught fire. The patient extinguished the flame with a damp cloth. With no further first aid, she then presented to A&E the following day, and was referred to our Burns Centre with a full thickness burn on her left dominant thumb.

The burn was managed conservatively to allow it to de-marcate. The patient was discharged home with a follow up appointment two weeks after the accident, allowing us to determine the level of terminalisation to provide her with the best functional outcome. During surgery, the necrotic distal phalanx debrided back to healthy bone. The distal intrapharyngeal joint was preserved and the tip was reconstructed with a volar-based flap (Fig. 2).

**Discussion**

As synthetic fingernails become increasingly popular, burns units might see a rising number of patients presenting with similar burns to our patient’s. To the best of our knowledge, there have not been any reported cases in medical literature of the acrylic or gel element in a synthetic nail resulting in a flame burn.

An experimental study conducted by Vanover et al. at Lamar University tested the flammability of various synthetic fingernails using the flame of a common birthday candle and a Bunsen burner.

The temperature of a candle flame ranges from 800-1400°C depending on the flame colour; while the temperature of a cigarette can reach 900°C during a puff and fall to about 400°C between puffs. Vanover et al. report that the average ignition time was 1.1s, with 58% igniting in 1 second or less when using a candle flame, while with an average of 0.8s, 87% ignited in 1 second or less when using higher temperature flames from a Bunsen burner. Once ignited, with the source of flame removed, the nails burned to completion. The study also suggested that once ignited, the nails are not easily extinguished.

The temperature of a cigarette when puffed is comparable to the lower end temperature spectrum of a candle flame, which would explain how the artificial nail in our case study ignited; when the patient was taking the final puffs on the cigarette, the butt was at a short distance from her acrylic nail, allowing enough time for it to ignite and result in the burn.

We do not believe that the public understands how flammable synthetic fingernails are, even from lower flame temperatures such as candles: an accident could result in a burn with devastating outcome, leading to terminalisation of the affected digit - in our case a vital dominant thumb - which may impair overall hand function.

There are several case studies that report significant burns resulting from spillage of nail glue adhesive (cyanoacrylate-based) onto cotton clothes; four presented with full thickness burns on their thighs, and one with superficial dermal burn on the abdomen. There is a known reaction between cyanoacrylate [CH2–(CN)CO2R] monomer found in nail glue adhesive and the hydroxyl [-OH] found in cotton or wool that could cause a thermal burn when in direct contact with the skin.

The flammability hazard of artificial fingernails is apparently well known in the beautician community. There are multiple beauty websites and blogs raising awareness of the potential risk of synthetic nails catching fire. A South Carolina USA news website, wistv.com, reported a news piece where a woman’s acrylic nail caught fire whilst lighting a candle in church in 2002.

We feel this hazard should be further publicized, especially to clients in beauty salons, through official medium in the form of a warning label or a supplementary leaflet, with the potential risk highlighted to the public.

**BIBLIOGRAPHY**