



High-pressure injection of silica-based paint into a finger

Jason Locker, Alan Carstens

The severity of injury in high pressure injection injuries is often underestimated due to the small, relatively benign looking entry wound.

These injuries most commonly involve the hand, most usually the pad of the thumb and index finger and often constitute a surgical emergency.

Case report

We report the case of a 28-year-old right-hand dominant painter, who used his left index finger to plug a hole in the tubing of a paint sprayer rated at 2000 psi. It contained a mixture of paint and silica material (used for non-slip surfaces).

The index finger became immediately swollen and painful. He consulted local doctors who washed the 1 mm puncture wound on the pulp and discharged him.

He presented to our emergency department 4 days later with a swollen index finger with a 1 mm entry wound at the pulp. The distal phalanx was pale with no capillary refill and was found to be insensate distal to the distal interphalangeal joint (DIPJ).

He was able to flex both the proximal interphalangeal joint (PIPJ) and DIPJ without pain.

Plain X-ray (Figure 1) showed radio-opaque material throughout the soft tissues corresponding to the middle and distal phalanges.

Figure 1. Plain X-ray of affected digit



He was taken to theatre expediently where the finger was explored using a Brunner type incision.

All of the subcutaneous tissues from the pulp as far proximal as the metacarpophalangeal joint (MCPJ) were found to be covered in granular grey matter (see Figure 2) which was still present despite washing with 8 litres of saline.

Figure 2. Granular grey matter within the digit



It was not possible to debride this tissue without devascularising the skin of the distal digit.

With loupe magnification, identification of anatomical structures proved difficult.

The digital nerves and arteries were found to be intact, but covered in paint.

The foreign material had not penetrated the flexor sheath.

Repeat exploration after 48 hours revealed demarcated skin along the radial border with full thickness ischaemic changes in the flaps.

The subcutaneous tissue was still covered in the grey matter which could not be washed away.

After 2 further debridements it became clear that the finger was not salvageable and underwent ray amputation 14 days after the injury.

Discussion

This is a relatively uncommon injury but recognition of the severity and potential complications is extremely important. Those affected tend to be young males in a new job, injuring their non-dominant hand (75%)

The prognosis is related to the material, temperature, pressure and site injected:

- Grease (25%) is thought to cause fibrosis, while paint (60%) causes immediate tissue necrosis which persists if the tissues are not completely debrided.
- Pressure greater than 7000 psi is thought to be 100% prognostic of amputation.
- Digital injuries are associated with a far worse outcome than those to the palm.

The recommended management is opening of fingers with removal of all paint especially around digital arteries.

In general, wounds should be left open for serial debridement.

In severe paint injection to a digit, early amputation should be considered.

This particular case is unusual as there was no sharp penetration of the skin - it was broken by the pressure—and the nature of the foreign body injected, which was a combination of paint and silica, making removal particularly difficult.

The resulting amputation of an index finger serves as a pertinent reminder of the dangers of high-pressure injection injuries.

Competing interests: None known.

Author information: Jason Locker, Orthopaedic Registrar, Dunedin Hospital;
Alan Carstens, Consultant Orthopaedic Surgeon, Dunedin Hospital

Correspondence: Dr Jason Locker, Dept Orthopaedics, Dunedin Hospital,
Private Bag 1921, Dunedin, New Zealand. jasonlocker@hotmail.com

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