Removal of a titanium alloy ring

Introduction

Injuries to fingers involving wearing rings, such as wedding bands, are among the most severe hand accidents and are notoriously hard to treat.

Successful management of such injuries relies on removing the ring quickly and safely. Common ring cutters used in accident and emergency are generally capable of removing rings made of gold, silver and pure titanium but fall short when used on metals such as titanium alloys. Attempting to remove these hardened metals in the acute setting can pose considerable risk of iatrogenic, secondary damage.

Discussion

Until recently, titanium and titanium alloys were mainly used in the industrial sector. They have been used in orthopaedics for both plates and prostheses because of the low rate of corrosion and good biocompatibility (Williams, 2001). The aforementioned qualities along with its lightweight properties and aesthetic appearance mean that titanium is now common in the jewellery market.

Although this patient did not suffer any serious consequences, a number of avulsion-type injuries resulting in degloving or amputation secondary to rings being worn have been reported (Fejjal et al, 2008). Urbaniak's classification of ring finger injuries (Urbaniak et al, 1981) is a commonly used reference.

1. Soft tissue wound – no rupture of vessels, nerves, tendons or joints
2a. Skin wound and bilateral rupture of vessels
2b. Tissue, vessel injury with partial rupture of nerves, tendons and joints
3. Complete degloving of soft tissue surrounding joints
4. Complete ring avulsion.

A review of the literature revealed one similar case (Kapickis and Kutz, 2007). The authors report a patient sustaining a crush injury involving a titanium ring that was removed with a powered cutting device resulting in a third degree burn requiring a skin graft.

Figure 1. Equipment used and the cut ring.

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Conclusions

Rings of any material, particularly titanium alloys, can pose a threat to fingers. The best method of avoiding these injuries is prevention: taking rings off when undertaking potentially dangerous activities. In the emergency setting removal of a titanium ring is at best difficult. The authors found the use of a diamond-cutting blade, cut copper piping, irrigation and patience to have a satisfactory result. BJHM

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LEARNING POINTS

- There will always be situations where common practice will fall short, leaving patient care relying on doctors' initiative.
- All doctors need to know when to ask for help. This case highlights how other services can on occasion be used in patient care.
- With titanium rings becoming more popular, the problems highlighted in this case are likely to reoccur.

Case Report

A 22-year-old man attended the accident and emergency department anxious about the inability to remove a titanium alloy ring from his right middle finger. The patient had worn the ring for several years but needed it removed for a physical examination. Initial advice given by accident and emergency physicians was to elevate the hand at home and to gradually remove the ring with the aid of lubrication.

The patient returned 4 days later with a painful, swollen finger complaining of 'pins and needles'. Numerous attempts at removing the ring had been made but to no avail. On examination there was mild swelling and erythema but there were no signs of vascular compromise and although he expressed symptoms of paraesthesia, sensation and power remained intact.

The tools available in accident and emergency did not make a scratch on the ring. The patient was referred to orthopaedics who tried to use a powered ring cutter in theatre. Unfortunately this had no impact either.

Consultation with other accident and emergency and orthopaedic units within the area did not lead to a solution. In desperation a call was made to the fire brigade but they also had nothing to offer.

The solution was found in the hospital works department. A small powered hand saw with a diamond-headed blade was obtained. With lubrication, a small, cut piece of copper piping was passed between the ring and the finger for protection. The ring was cut in one place, rotated and cut on the opposite side (*Figure 1*). A jet of water was sprayed on the saw head to reduce thermal injury.

The diamond-headed blade was initially approximately 5 cm wide but on completion of cutting was only 2 cm wide. The patient sustained no secondary injury and made a satisfactory recovery.