



Removal of rings ED guideline

Safest techniques for removing an entrapped ring from a finger, toe, or penis are reviewed and outlined in this guideline taking into account the metal composition of the rings in question that need to be removed to avoid tissue ischaemia with potential permanent tissue necrosis.

Purpose

To utilise the current best available evidence in the assessment and management to remove entrapped rings with the tools available at SCGH ED. Those rings can become painful causing a tourniquet effect to patients' fingers, toes or genitalia that in turn can cause ischaemia.

Indications

The most common reason for ring removal is swelling. Swelling can be caused by multiple reasons like trauma, allergic reactions, pregnancy, cardiac/renal failure or venous thromboembolism. Although, uncommon, penile entrapment has been described after patients place various constriction devices around the penis or scrotum to maintain or enhance an erection.

Considerations

- Jewellery often has sentimental value as well as financial value and therefore, a decision to remove or cut off, may well be a struggle for some patients to make. Before undertaking ring-removal procedures, practitioners must gain patients' informed consent to remove or damage their property. Written consent is preferable to protect the health practitioner against claims from patients at a later stage.
- Patients' pain or discomfort must be assessed with a suitable scale and for a quick ring removal, appropriate analgesia must be provided:
 - Nitrous oxide can be effective because its absorption is rapid and it is short acting. Therefore the effects wear off equally rapidly to allow for a prompt discharge of the patient home post removal of the problematic ring.
 - In patients with underlying injuries such as metacarpal fractures, crush injuries or dislocations, nerve blocks should be used.

In SCGH ED, Ropivacaine 0.75% is usually the local anaesthetic of choice because of its long acting properties (12-18hrs), maximum dose 3mg/kg. Ropivacaine 0.75% in 10mls (7.5mg/ml) is available. Minor blocks usually require 1-25mls (7.5-188mg) pending the surface area to be anaesthetised, which does not usually exceed the 3mg/kg maximum dose, especially with fingers that never require such a large volume of anaesthetic. Average fingers volume for nerve block (3-4mls), hands (multiple injections-10mls), ankles (multiple injections-20mls).

- If the swelling is minimal (no ischaemia or nerve injury or wounds) and/or the patient wants a non-destructive intact removal of the ring first. In SCGH ED, there is the elasticated band wrap technique and the ring rescue non-destructive ring removal set technique (described in this guideline) worth considering before cutting/destroying the entrapped ring. The patient needs to be informed that these methods are painful and may not be successful depending on the amount of entrapment.
- Penile entrapment should be considered a potential urologic emergency. Patient embarrassment can result in delayed presentation with progressive venous, lymphatic and arterial obstruction. Urethral injury or penile necrosis is associated with rings in place for longer than 72hrs.
- Ring composition: There are three different main groups of metal used to make rings/devices, those metals need to be cut/destroyed with different blades/methods.
 1. **Soft metal or plastic:** Gold, silver, copper or tin maybe cut with a hand operated or electric ring cutter.
 - Check blade on manual ring cutter, it needs to be sharp and clean.
 - Check type of blade on the electric Gem II ring cutter, make sure you have the blue carbide cutting disc for those rings and it is not worn down completely. Remember that the blade on electric ring cutters needs to be rotating before it touches the ring not to damage the blades unnecessarily.
 - If you use the black and decker electric cutter, make sure the blade is sharp and clean. Remember that the blade on electric ring cutters needs to be rotating before it touches the ring not to damage the blades unnecessarily.
 2. **Hard metal:** Steel or titanium rings maybe cut with an electric ring cutter.
 - Check type of blade on the electric Gem II ring cutter, make sure you have the red diamond cutting disc for those rings and it is not worn down completely. Remember that the blade on electric ring cutters needs to be rotating before it touches the ring not to damage the blades unnecessarily.
 - If you use the black and decker electric cutter, make sure the blade is sharp and clean. Remember that the blade on electric ring cutters needs to be rotating before it touches the ring not to damage the blades unnecessarily.
 3. **Tungsten carbide or ceramic:** These rings need to be shattered with a set of locking pliers.

Techniques

- Common preparation: Inform/consent patient about the procedure, provide them with analgesia as necessary.
- On patients with ischaemia, nerve deficit, deep open wound, fracture or dislocation warrants emergency removal by cutting or breaking the ring immediately.



- **Elasticated band wrap technique:** For valuable rings not requiring emergency removal this approach is acceptable (see elastically band wrap technique video link-appendix 1).

In general, inexpensive soft metal or plastics rings should be cut off because this procedure can be carried out quickly without analgesia/nerve blocks. Warn the patient that the removal of the ring by the elastically band wrap method is painful and provide analgesia as necessary.

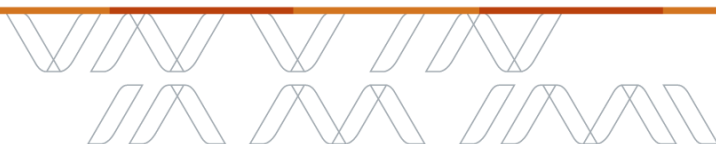
- Prior to use, cover any open wounds to prevent contamination of equipment and damage to the wound.
 - Place one end of the green elastically band (you can find them on the oxygen masks in ED) under the ring from the proximal to the distal side.
 - Wrap the band tightly around the digit overlapping the wrappings so that tissue is not visible.
 - Continue wrapping beyond the PIP joint of the digit.
 - Once the wrapping is complete, place some lube around wrapping band and unwrap the proximal end which will gradually remove the entrapped ring. In some patients, rewrapping maybe necessary.
- **Ring rescue non-destructive ring removal set technique:** For valuable rings not requiring emergency removal this approach is acceptable (see technique video link-appendix 1). **DO NOT USE** if there are fractures on affected fingers/toes, tendon or neurovascular injury (not recommended).

In general, inexpensive soft metal or plastics rings should be cut off because this procedure can be carried out quickly without analgesia/nerve blocks. Warn the patient that the removal of the ring by the ring rescue non-destructive ring removal set method is painful and provide analgesia as necessary.

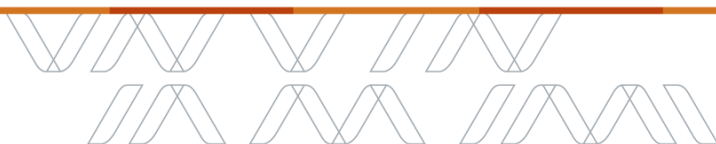
- Prior to use, cover any open wounds to prevent contamination of equipment and damage to the wound.
- Apply the ring rescue device over the affected finger. Ensure the device location is correct (against the ring, but not overtop). Close the pressure valve by turning clockwise. Pump the device until the needle is in the light blue zone. Allow the device to work for about 5 minutes with hand elevated before opening the pressure valve to release pressure. Remove the device by gently wiggling it from the finger.
- Apply the supplied lubricant on the affected area.
- Immediately attempt to remove ring using twist and pull or rocking motions.

If these procedures are unsuccessful proceed with the cutting or breaking of the entrapped ring.

- **Soft metal or plastic rings:** Soft metal (gold, silver, copper or tin) or plastics rings can be cut in ED SCGH with a manual operated ring cutter or electric ring cutters. Become familiar in how to use the individual ring cutter utilised (check appendix 1 for video links).
- Prior to use, cover any open wounds to prevent metal filings from entering and causing contamination.



- Place the guard of the ring cutter under the ring on the palmar aspect of the hand or the plantar aspect of the foot.
 - Rotate the ring to get any stone out of the way and place the thinnest part of the ring under the saw blade.
 - Put eye safety equipment on prior to cutting ring.
 - With the **manual ring cutter** apply the saw blade wheel to the ring and turn it, the friction of the ring cutting process generates heat that in turn can cause discomfort and burn the patient skin. To reduce this risk, water should be used during this process to reduce the heat of the metal being cut.
 - With the **electric ring cutters** (GEM II versus Black & Decker) in SCGH ED: If you utilise the GEM II make sure you use the carbide cutting disc (blue colour). If you utilise the Black & Decker it only has one type of disc for all rings. With the electric ring cutters it is important that the blade wheel is running before it touches the ring to prevent damage to the blades. Do not place undue pressure to the running blades to fasten the process as it will cause damage to the blades themselves. Be patient. The friction of the ring cutting process generates heat that in turn can cause discomfort and burn the patient skin. To reduce this risk, water should be used during this process to reduce the heat of the metal being cut.
 - When the ring is fully cut, use arterial forceps to grab the two edges and pry open or use the GEM ring spreader to pry open.
 - If difficulties are found to pry open the ring edges, alternatively cut the ring in two places to permit removal. Make sure that protection is placed under the first cut sharp edges of metal by placing gauze under it while the second cut is undertaken.
 - Reassure the patient that any rings cut with the ring cutters usually can be repaired by a jeweller.
- **Hard metal:** Hard metal (steel or titanium) rings can be cut in ED SCGH with electric ring cutters. Become familiar in how to use the individual ring cutter utilised (check appendix 1 for descriptions-video links).
 - Prior to use, cover any open wounds to prevent metal filings from entering and causing contamination.
 - Place the guard of the ring cutter under the ring on the palmar aspect of the hand or the plantar aspect of the foot.
 - Rotate the ring to get any stone out of the way and place the thinnest part of the ring under the saw blade.
 - Put eye safety equipment on prior to cutting ring.
 - With the **electric ring cutters** (GEM II versus Black & Decker) in SCGH ED: If you utilise the GEM II make sure you use the diamond cutting disc (red colour). If you utilise the Black & Decker it only has one type of disc for all rings. With the electric ring cutters it is important that the blade wheel is running before it touches the ring to prevent damage to the blades. Do not place undue pressure to the running blades to fasten the process as it will cause damage to the blades themselves. Be patient. The friction of the ring cutting process generates heat that in turn can cause discomfort and burn the patient skin. To reduce this risk, water should be used during this process to reduce the heat of the metal being cut.
 - When the ring is fully cut, use arterial forceps to grab the two edges and pry open or use the GEM ring spreader to pry open.



- **Tungsten carbide or ceramic:** These rings can be shattered in ED SCGH with a set of locking pliers (vise grips). Become familiar in how to use those pliers -vise grips- (Check appendix 1 for technique-video link).
 - Prior to use, cover any open wounds to prevent metal particles from entering and causing contamination/damage.
 - Cover remaining of hand with a glove with the affected finger cut off to fit around and to reduce skin damage from shattering pieces to the remaining fingers.
 - Place a towel underneath affected hand with enough overlap to cover hand/pliers when pressure is applied.
 - Wear eye protection and gloves.
 - Using the locking pliers fit around width of ring, when tight place towel over hand and pliers to apply locking pressure. If ring does not shatter, turn the lock of the pliers clockwise a tiny bit and try again until ring shatters.
 - Inspect hand for any potential injuries post-removal and treat accordingly.

Post-procedure

Removal of a ring can cause soft tissue trauma, including bruising or small cuts. After ring removal, clean digit, toe or penis and dress it if necessary. Re-evaluate neurovascular status. If there is clinical suspicion for digital/toe fracture then xray accordingly. For digital/toe swelling, instruct patient to keep affected limb elevated and ice it for the next 3 days (for 20 minutes every 4 hours). Advise patient not to wear another ring on affected finger/toe until the pain and swelling has completely resolved. Verify tetanus status and give prophylaxis as required. Patients with penile rings should be able to void normally before discharge.

Indications for speciality consultation

After ring removal from a finger or toe, consultations with plastics or orthopaedics surgeon is warranted for the following findings:

- Persistent signs of ischaemia
- Open fracture
- Open joint dislocation
- Fracture with dislocation
- Unstable fracture
- Tendon injury
- Digital nerve injury

Emergency urology consultation is indicated for patients with penile ring entrapment and signs of penile ischaemia or necrosis. Urgent urology consultation is also granted if post-removal of ring there is persistent ischaemia, difficulty voiding, or deep ulceration with potential involvement of the urethra or cutaneous urethral fistula.



References

Black & Decker Electric ring cutter. *User instruction manual*. 2022

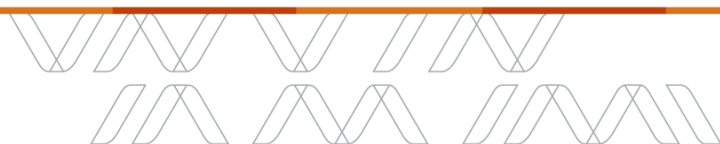
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Appendix 1

1. Elasticated band wrap technique

1.1. Demonstration video: W:\Emergency\SCG\NP\Education videos\SCGH removal of rings guideline videos.pptx



2. Ring rescue non-destructive ring removal set technique

2.1. Demonstration video: W:\Emergency\SCG\NP\Education videos\ SCGH removal of rings guideline videos.pptx



3. Manual ring cutter technique

3.1. Demonstration video: W:\Emergency\SCG\NP\Education videos\SCGH removal of rings guideline videos.pptx



4. Gem II electric ring cutter technique

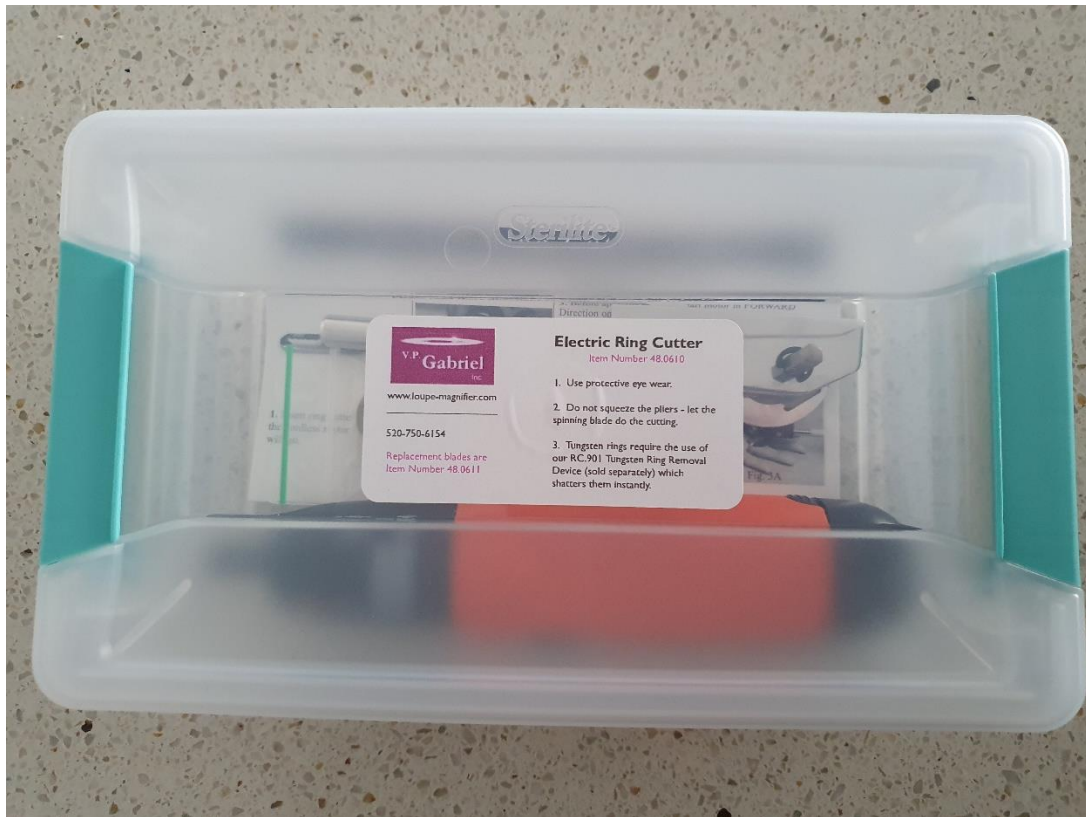
4.1. Demonstration video: W:\Emergency\SCG\NP\Education videos\ SCGH removal of rings guideline videos.pptx





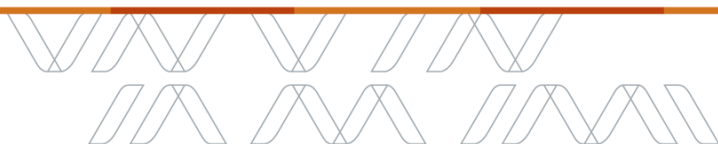
5. Black & Decker electric ring cutter technique

5.1. Demonstration video: W:\Emergency\SCG\NP\Education videos\SCGH removal of rings guideline videos.pptx



6. Locking pliers (vise grips) tungsten shattering technique

6.1. Demonstration video: W:\Emergency\SCG\NP\SCGH removal of rings guideline videos.pptx



Appendix 2

1. Extra equipment:

1.1. Ring spreader



This document can be made available in alternative formats on request.

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