



Orofacial Trauma Mini Series

Session 2: Dentoalveolar & soft tissue trauma

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Orofacial Trauma

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Veterinary Dental Oral & Maxillofacial Referrals

Soft Tissue & Dental Trauma

Following emergency & general history, examination and stabilisation, then specific head, neck and oral and dental examination, with accompanying imaging, diagnosis of pathologies is made. This problem list is then triaged to identify appropriate order of treatment. Treatment types are considered and who/ where (which speciality, hospital setting etc) is best able to deal with these issues, treatment and potential complications. Typically a combination of injuries is present.

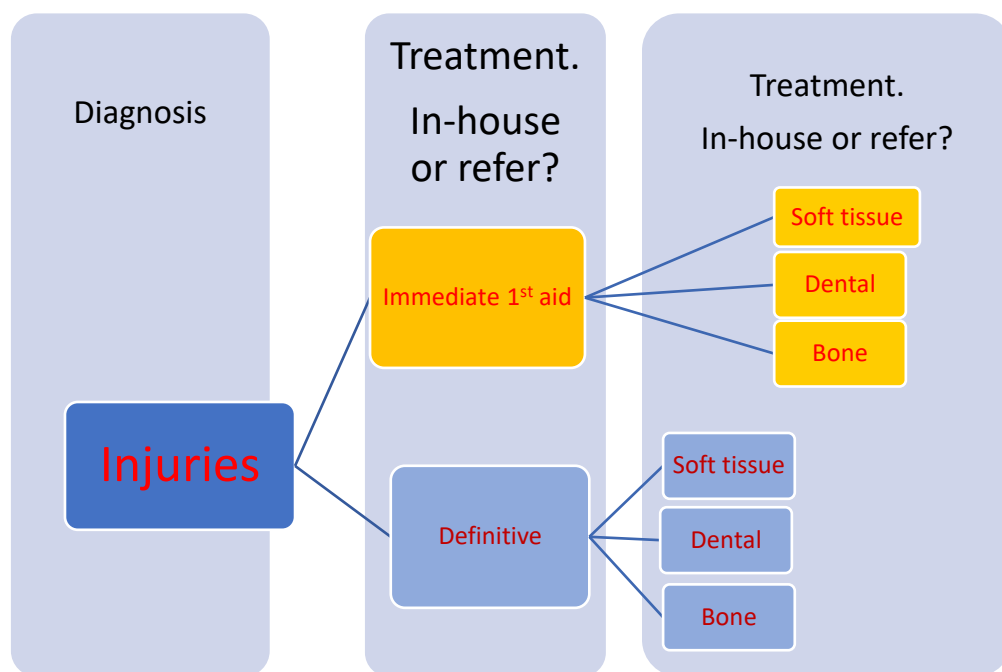
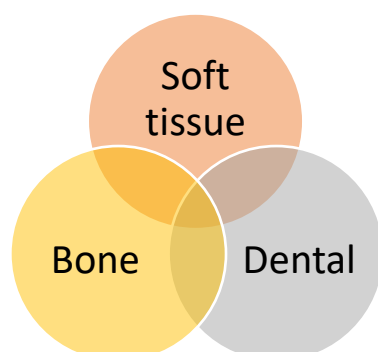


Fig1



- Multiple
- Mixed
- Triage
 - Emergency
 - Urgent
 - Non-urgent
- Soft tissue
- Dental

Fig2

Visualisation and identification all injuries during specific area examination is essential - first ensure the area is cleaned of debris and clipped where required.

Clean field preparation requires removal of foreign, devitalised and contaminating material by initial irrigation and debriding the area. Calculus and plaque are physically removed by scaling. Polishing with oil-free paste (eg pumice powder + water) may also be required where bonding to teeth is required for treatment. 0.12% chlorhexidine gluconate solution is typically used to prep the oral cavity, whilst stronger solution may be used as normal extra-orally.

Irrigation of wounds with Hartmann's solution (set-up giving set, 3-way tap, 2x10ml syringes, blue needle).

Antibiotics are not proven by all studies to reduce or prevent infection, however it is typically accepted that maximum benefit is derived where given as soon as possible (eg IM amoxicillin or an IV preparation) and prior to surgery. This 'short and sharp' approach of either one-off moderate-high dose or as part of a 3d course, rather than long courses, is preferred except where otherwise indicated in specific cases (eg osteomyelitis).

Soft Tissue

Emergency

1. Haemorrhage

- a. Due to excellent blood supply to facial areas
- b. Aim = rapid, effective haemostasis
- c. Methods:
 - i. Ligate transected vessel. Only tie off carotid in emergency!
 - ii. Digital (+ swab) pressure – 5min.
 - iii. Diathermy – minimise use however.
 - iv. Chemocautery – eg sterile silver nitrate 'swab-type' applicators. Use only where required.
 - v. Bone wax – if local crush of bone vessel with haemostats not possible. Minimise use.

2. Pain

- a. Due to injury + excellent sensory innervation to facial structures (Trigeminal n br).
- b. Multimodal analgesia:
 - i. Opiates eg methadone, buprenorphine
 - ii. Dogs – paracetamol (IV perfalgan & oral forms)
 - iii. NSAIDs
 - iv. Local analgesia eg lidocaine, bupivacaine
 - v. Stabilise areas of pain on movement eg apply muzzle to jaw fracture area
 - vi. Other combinations may include ketamine, gabapentin, amantadine etc as appropriate – please consult pain/ anaesthesia/ critical care specialist.

Urgent

Variables: Assess all tissues thoroughly including -

1. Tissue Type:

- Tongue – eg excellent vascular supply, avoid tethering and movement restriction.
- Lip -eg alignment of edges and mucocutaneous junction.
- Palate – thick, tough mucosa ('palatal gingiva').
- Mucosa – delicate, thin, sensitive. May be friable.
- Gingiva – tough, thick, better than thin mucosa for suture placement.
- Papillae – eg of parotid ducts in caudal maxillary buccal mucosa dorsal to molars.
- Neurovascular bundle – 'NVB'. Haemorrhage, nerve damage.

2. Wound Type:

- Clean
- Contaminated
- Vital tissue – pink, bleeding, pliable.
- Devitalised – separating, pale. Reassess 24hr.
- Necrotic – dark, non-bleeding, malodour. Remove (debride).

3. Wound Overlying:

- NVB - accidental perforation or inclusion during suture placement.
- Bone – challenge closing dead space.
- Roots – damage eg if drilling.
- Further injury – eg movement of bone below mucosa – wound dehiscence.

Urgent Soft Tissue Injury Types

1. Laceration

- a. Cut or tear
- b. Path of least resistance – often along/ to/ from mucogingival line.
- c. Underlying injury? Eg over a fracture line. Enables contamination (bone - compound fracture, roots and pulp infection etc).

- d. May or may not involve underlying neurovascular bundles.
- e. Treatment:
 - i. Irrigate, debride (refresh edges – scalpel blade cut ideal)
 - ii. Suture - Monocryl
 - iii. Align margins
 - iv. Close deficits – assess & select tension relieving technique eg undermine.
 - v. Zero tension
 - vi. Antibiotics?

2. Avulsion/ Degloving

- a. Avulsion of an area of soft tissue attachment from underlying tissues (muscle, connective tissue, and most notably in the oral/facial areas, bone).
- b. Compromises blood supply to the avulsed tissue (skin, mucosa, gingiva).
- c. Typically removes all or some periosteum from bone – compromises blood supply to bone.
- d. Creates an area of dead space.
- e. May be in combination with laceration or other injury.
- f. Rostral mandible/ chin, mandibular body and premaxilla common.
- g. Challenge to reconstruct whilst maintaining tissue vitality, avoiding dead space, correctly align and suture, especially where missing teeth.
- h. Subsequent dehiscence reduces tissue for reconstruction further.
- i. Treatment:
 - i. Irrigate, debride
 - ii. Suture – resorbable monofilament eg Monocryl. Fig 3-6
 - iii. Align margins – location?
 - iv. Eliminate dead-space
 - v. Zero tension
 - vi. Antibiotics?

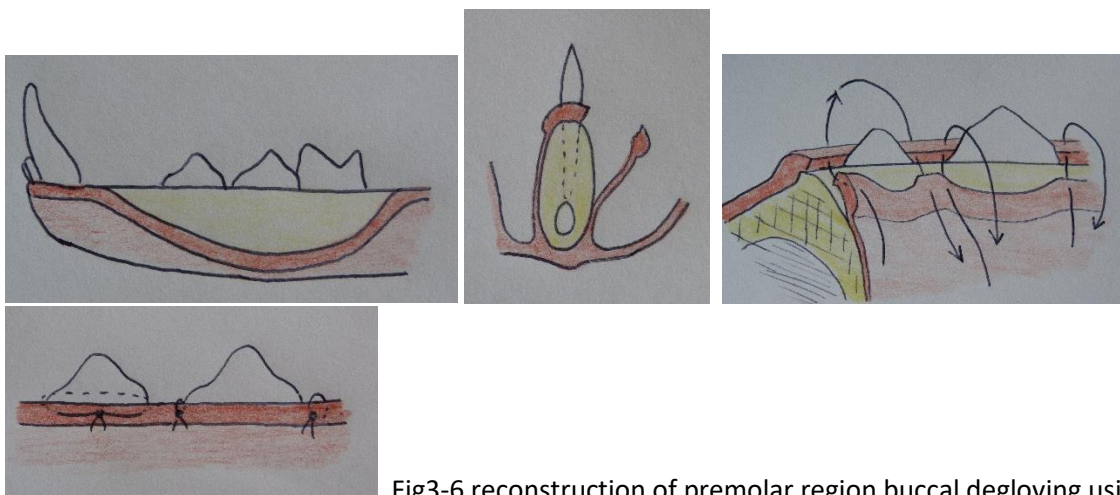


Fig3-6 reconstruction of premolar region buccal degloving using sling suture around teeth where necessary, in addition to simple interrupted. Eliminate dead-space, consider penrose drain.

- vii. Reconstruction of buccal mucosa with periosteum using drill-holes. Fig 7-9.

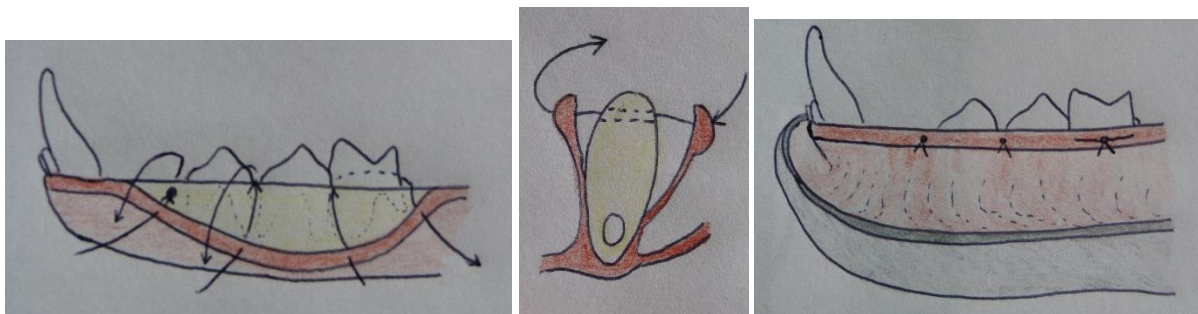


Fig7-9 Plan drill-hole location through alveolar crestal bone to avoid tooth roots.

viii. Premaxilla degloving

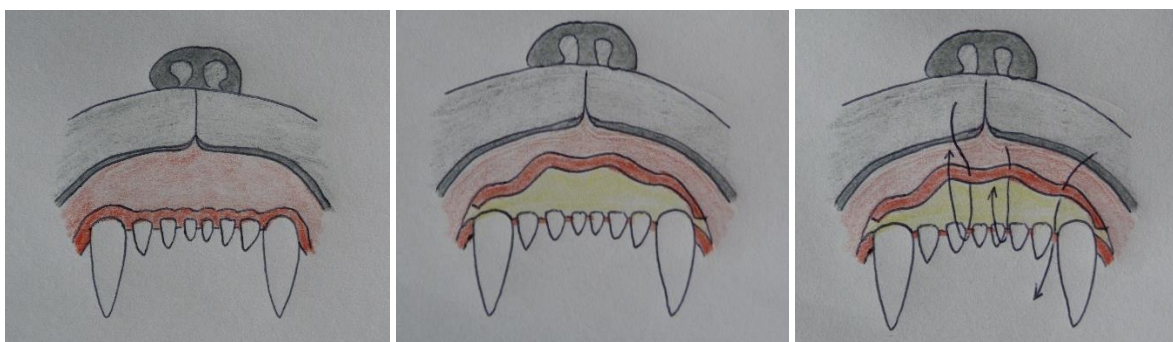


Fig10-12 Reconstruction - gingiva available (more flap integrity thus more suture options available).

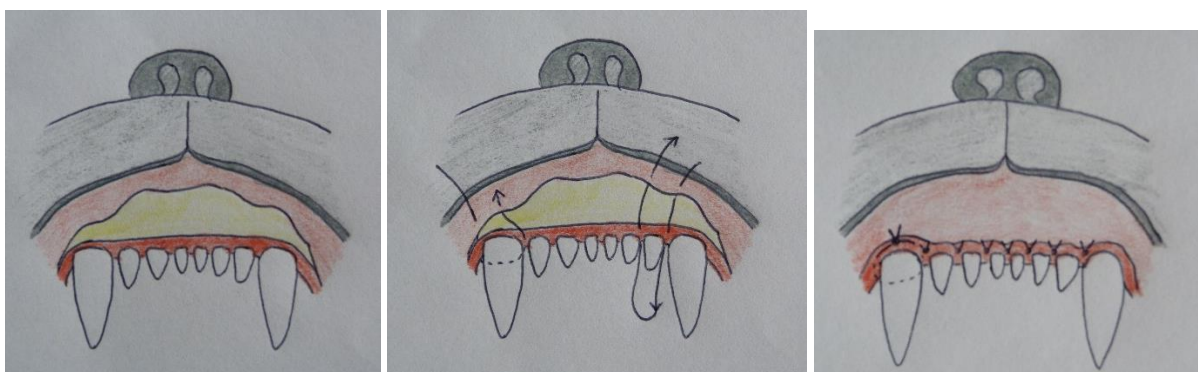


Fig13-15 Reconstruction – no gingiva available on avulsed tissue. Sling and horizontal mattress sutures reduce tension and cheese-wire effect of suture.

ix. Rostral mandible/ chin degloving

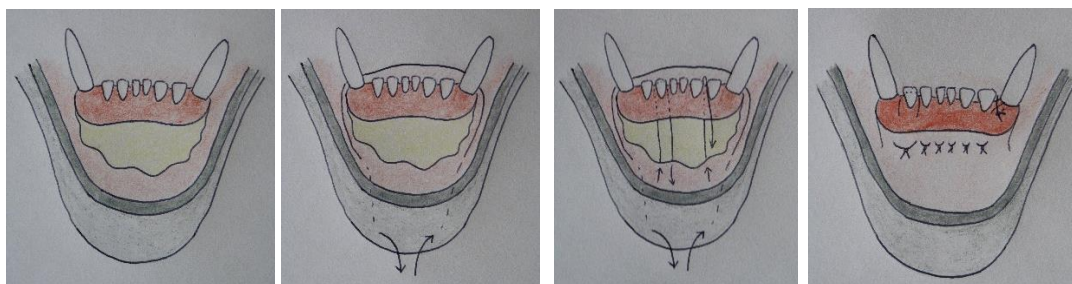


Fig16-19 Reconstruction – initial sling-suture to reduce dead-space & tension, mucosa sling sutures.

x. Chin and mandibular body degloving – missing teeth & musocal deficit.

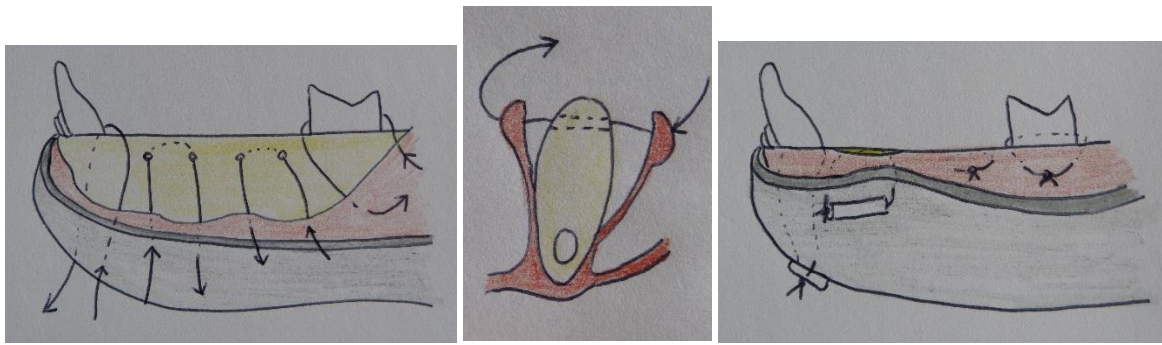


Fig20-22 Reconstruction – degloving with missing teeth & mucosa. Rostral to caudal: chin sling skin suture, alveolar drill holes for skin (large mucosal deficit) & mucosa horizontal mattress sutures, tooth sling suture. Alveolar crestal bone drill-hole and suture detail. Final appearance with button at chin and short tube caudal to canine to reduce suture tension on skin. Small deficits, leaving areas of exposed alveolar bone (dorsal to small tube, fig21), typically epithelialise rapidly.

3. Penetration – remove cause / FB (xray lips for tooth & bone fragments)
4. Crushing – remove cause (eg identify traumatic malocclusion), debride area
5. Neurovascular bundle trauma
 - a. haemorrhage
 - b. sensory abnormality
 - i. temporary/ permanent
 - ii. anaesthesia
 - iii. paraesthesia
 - iv. hyperaesthesia

Dental

Emergency

1. Loose Teeth
 - a. Whole or portion
 - b. Choking hazard
 - c. Malocclusion
 - d. Re-implantation if immediate action (see tooth avulsion in 'luxation')
2. Pain
 - a. Analgesia
 - i. NSAIDs (+/- opiate)
 - ii. Dog – paracetamol
 - iii. Open to drain (lance) if abscess
 - iv. Antibiotics if re abscess & definitive treatment not possible immediately

3. Spreading infection

- a. Pyrexia, malaise
- b. Swelling, breathing & swallowing difficulty
- c. Open to drain if possible.
- d. Aggressive antibiotic use; typically amoxicillin IM/IV initially.
- e. Add metronidazole if not responding.

Urgent

Variables:

- ❑ Pain – can be extreme but identification a challenge
- ❑ Temporality – when injury occurred
- ❑ Occlusion – original vs current & possible. Function & comfort.
- ❑ Fracture line – assist healing vs prevent healing.
 - 1) Tooth infected
 - remove as will prevent bone healing
 - BUT care re contamination and distraction.
 - 2) Tooth no evidence of infection
 - Typically leave to aid fixation eg bonding
 - Unlikely to compromise bone healing
 - BUT potential pain unless treated eg re pulp
 - Treat after bone healing (will likely progress to pulp necrosis)

1. Fracture

- a. Complicated crown fracture
 - i. Pulp exposed
 - ii. Pulp inflammation (pulpitis) pain.
 - iii. Pulp necrosis & infection eg lead to abscess and pain.
 - iv. Treatment:
 - Extract
 - OR
 - Endodontic treatment eg root canal treatment (may initially perform 1 stage to attain comfort). Refer to vet dentist with endodontic expertise. Consider topical chlorhexidine oral rinse BID in meantime.

- b. Uncomplicated crown fracture – deep
 - i. Near exposure of pulp - pink 'pulpal blush' may be visible.
 - ii. Dentinal tubules exposed near to pulp
 - iii. Potential pain and sensitivity
 - iv. Potential ingress of bacteria and subsequent pulpitis, necrosis & infection
 - v. Treatment:
 - Extract
OR
 - Composite 'bandage' restoration (seals tubules to desensitise & protect)
CAUTION! Expert assessment & treatment required. Sealed-in infection can be fatal.
OR
 - Endodontic treatment eg root canal treatment.
- c. Uncomplicated crown fracture – superficial
 - i. No pulpal blush
 - ii. Otherwise as above but less potential for tooth infection.
 - iii. Treatment:
 - Seal/ composite 'bandage' restoration
OR
 - Extract if other options not possible
OR
 - Xray monitor 3-6months (in case of issue may require extract or root canal treatment)
- d. Root complicated fracture
 - i. Xray & extract all portions
- e. Root uncomplicated fracture
 - i. May be part of crown-root fracture
 - ii. Predisposes to periodontal disease re abnormal shape, rough surface, attachment compromise
 - iii. Treatment
 - Extract
OR
 - Crown lengthening + restoration & xray monitor 3-6m (refer)
OR (if small)
 - Ensure daily toothbrushing & xray monitor 3-6m

2. Luxation

- a. Concussion & Subluxation
 - i. Periodontal support injury
 - ii. Possible neurovascular compromise
 - iii. Tender to percussive pressure
 - iv. Possible haemorrhage
 - v. Normal location within alveolus

- vi. No alveolus fracture
 - vii. Subluxation also shows mobility
 - viii. Treatment
 - Soft food 2 weeks
 - Odontoplasty? Splint?
 - ix. Monitor
 - 4-8wks, xray 1year
- b. Lateral luxation
- i. Laterally displaced tooth
 - ii. Alveolar bone fracture & periodontal injury
 - iii. Neurovascular compromise
 - iv. Laterally displaced crown
 - v. Bleeding, pain, immobile
 - vi. Displaced within alveolus
 - vii. Altered PDL space
 - viii. Treatment
 - Reposition & splint 4weeks
 - Ok or root canal treatment?
 - OR
 - Extract
 - ix. Monitor
 - Xray 4wks, 3-6m, 1year, (annual for 5yr?)
- c. Extrusion
- i. Partial oral (outward) dislocation
 - ii. Periodontal attachment injury
 - iii. Neurovascular compromise
 - iv. Elongated tooth & step defect
 - v. Sulcal bleeding, pain, mobile
 - vi. Empty apical alveolus
 - vii. Altered PDL space
 - viii. Treatment
 - Reposition & splint 2weeks
 - Root canal treatment
 - OR
 - Extract
 - ix. Monitor (if immature)
 - Xray 4wks, 3-6m, 1year, (annual for 5yr?)
- d. Intrusion
- i. Apical (inward) dislocation
 - ii. Contusion (crushing) injury
 - iii. Neurovascular loss
 - iv. Alveolus fracture
 - v. Short tooth & step defect
 - vi. Bleeding, pain, immobile
 - vii. Absent periapical space

- viii. Altered PDL space
 - ix. Treatment
 - Reposition & splint 4-8weeks
 - Root canal treatment
 - OR
 - Extract (care - oronasal communication/ 'ONC'?)
 - x. Monitor (RCT)
 - Xray 6m, 1-2year, (4yr?)
- e. Avulsion
- i. Full oral (outward) dislocation
 - ii. Periodontal attachment loss
 - iii. Neurovascular loss
 - iv. Empty alveolus
 - v. Bleeding, pain
 - vi. Empty alveolus
 - vii. Possible bone fracture
 - viii. Treatment
 - Replant & splint 2-4weeks
 - Handle root only
 - Must be <60min drying time
 - Keep in Hartmann's, saline, saliva, milk if not immediate replant
 - Antibiotics 7d
 - OR
 - Root canal treatment (& monitor)
 - OR
 - Haemostasis & any closure only!

Non-urgent

May apply to various injuries where pain, infection and other issues are not present.

Treatment is assumed to occur at a later date eg on removal of a fixation device.

1. Uncomplicated fracture
2. Luxation
3. Discoloured teeth
 - a. Pink, purple, grey
 - b. Trauma to pulp resulting in pulpal bleed and pulpitis
 - c. Initial likely discomfort re pulpitis
 - d. Typically result in sterile pulp necrosis
 - e. Treatment:
 - i. NSAIDs may initially assist re pulpitis

- ii. Xray monitor (eg 6m)
OR
- iii. Extract
OR
- iv. Root canal treatment (refer)

Flap extension technique:

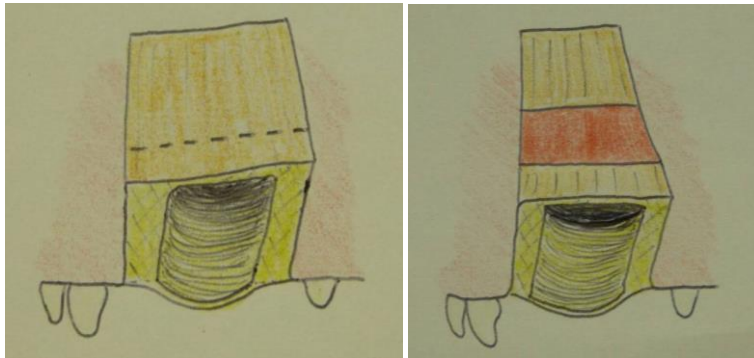


Fig23-24 creation of a split thickness flap and extension of length by cut of the inelastic periosteum which lines the underside of a flap. Other techniques include undermining and vertical releasing incision elongation. Eg to close areas of extraction where soft tissue deficit and/or tension is present.

NB Practical techniques are ideally learned and practised on cadaveric specimens to ensure familiarity, ability and confidence with techniques prior to emergency situations.