



Academy Step by Step

Interdental Wiring & Composite Splinting



Fig. 1



Fig. 2



Fig. 3

Introduction

The use of interdental wiring, with or without the use of composite splints, can be a quick and inexpensive method for repairing fractures of the jaws. Normally the splint provides further reinforcement and rigidity without the need to resort to standard orthopaedic methods of pins and screws. The following guide assumes any soft tissue damage to be repaired and teeth critically damaged to be removed.

In some cases it may be wise to retain teeth that can be treated later (e.g. with root canal therapy) but not if their presence will retard healing.

Comminuted fractures are not good subjects for interdental wiring and splinting alone. They will require additional stability from interfragmentary and/or cerclage wiring or mini-plates.

The jaws are a special case in orthopaedic repair due to the presence of multiple

tooth roots, large neurovascular bundles and the likelihood of thin, poor quality bone in places. There are few safe corridors (or "no-fly zones") in which to place pins or screws without causing damage. The radiographs (Figs. 1, 2 & 3) shows damage to tooth roots and the pulpal blood supply from pins placed without consideration for the welfare of the teeth. In addition the oral cavity should ideally be able to be used almost

immediately post op. Although fracture apposition should be as good as possible, the ability of the mouth to achieve good occlusion when closed is vital. If the mouth cannot close, or is deviated, by abnormal tooth contact this must be relieved immediately. Any tooth contact onto a composite splint on the opposite jaw will also result in rapid instability of the splint in addition to discomfort.

Dental Acrylic Starter Kit contains:

- 2 x Etching Compound - Etchgel Phosphoric 40% Syringe 5g plus 3 Tips
- 1 x MaxiTemp Hp 'Cold Cure' Acrylic 2 x 50ml Cartridges
- 1 x MaxiTemp Mixing Tips - Single Use x 50
- 1 x MaxiTemp HP Re-useable Applicator Gun



Wiring

Interdental wiring of the mandible needs to recognise the mechanics of the structure. The dorsal mandible is the tension surface with the ventral being the compression surface. Therefore the forces that distract the two side of the fracture will occur close to the teeth – ideal for interdental wiring. The best subjects for interdental wiring will be rostral to the lower carnassial. If the fracture is caudal to the carnassial, interfragmentary wiring techniques using the coronoid process (dorsal ramus) as an anchor will be needed. At least 2-3 good teeth on either side of the fracture are required as a general rule. These teeth need to be periodontally sound ideally.

Many texts advocate the use of wire that is too big. Thick wire may be strong but is hard to work with, bend, twist or run through hypodermic needles as introducers. For virtually all dogs SWG 24/0.5mm wire is best. Some very small dogs and cats might need SWG 26 wire and some big dogs might need SWG 22/0.65mm. Pre-stretching the wire also helps reduce kinking. Standard surgical texts include a number of wiring techniques. These include Ivy, Stout Multiple Loop, Essig and Risdon. The Stout Multiple Loop technique is an extension of the Ivy and is suited to mandibular body fractures. The Risdon technique is indicated more for rostral mandibular and maxilla fractures. The Essig technique is suited to luxated or avulsed canine teeth. Neither will be described here. For the Stout technique the initial security of the wires depends largely on their ability to contour to the shape of the teeth. In some cases it may be necessary to place the wire through small bone tunnels between the teeth to improve security further. Thinner wires contour to the shape of the teeth better and with less force. They are less likely to pop out of position as the wire is tightened.

The Stout Multiple Loop technique (Fig. 4) entails a wire looped round the caudal most tooth being used as an anchor. At the very least, two teeth are required on either side of the fracture.

Splinting

Splinting using a cold cure composite (MaxiTemp: Henry Schein) is a simple method of reinforcing the interdental wires. Splints cannot be used on their own. Materials of this type are known as self-curing bis-acryl composites and are mainly used in human dentistry as temporary crown and bridge material. Their main advantage over traditional acrylic materials is the lack of exothermic reaction when setting. Traditional acrylics (methyl methacrylate) can damage the soft tissues and dental pulp of teeth with this heat. The composites are also simple to use and non-toxic. They produce no fumes either. Multiple layers can be placed sequentially and setting is relatively quick.

Before placing a composite splint the teeth need to be cleaned with a hand or ultrasonic scaler. This is important! Some texts also advocate roughening the enamel surface with a coarse grade of non-fluoride pumice to improve the retention of the splint. Although the shape of the crowns will provide a degree of

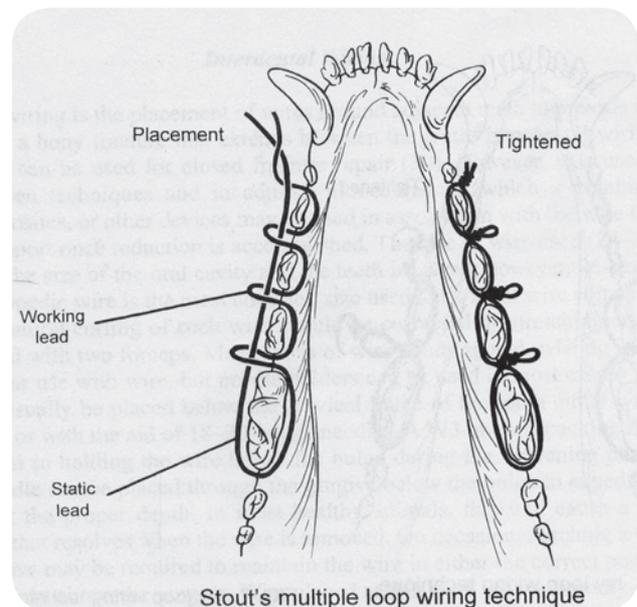


Fig. 4

This location depends on the position of the fracture but the caudal tooth is normally the large lower carnassial/ first molar. The two wires run rostrally lingual and buccal to the teeth. One wire is termed the "static" wire and other the "working" wire. The working wire and the loops can be either lingual or buccal to the teeth depending on the least interference with the occlusion and ease of placement. In this guide the images show the loops lingual to the teeth whereas the diagram shows buccal. Both are acceptable.

Some operators tighten the loops as they form them and others form all the loops then tighten them around the static wire at the end one by one. Once the loops have been tightened they can be bent to lie along or between the crowns of the teeth so they are not in the way of occlusion when the mouth closes.

retention for the splint as the composite flows between them, it is wise to add a further layer of retention by acid etching the teeth.

Acid etch gels are advised as they are easier to control than liquid. They comprise phosphoric acid (40%) and should be used as per the instructions in the package. The gel is carefully placed on the enamel surface of the teeth to be splinted for 30 to 45 seconds only and then rinsed off with water for 15 seconds. Ensure all gel is completely removed from the tooth surface and avoid any soft tissue contamination. The etched surfaces should have a frosty appearance when air dried. If the teeth are small, it is wise to etch the whole crown. For larger teeth it may suffice to etch only the lingual surfaces. Etched teeth may show a stained area post-op. If cosmetic results are important then the owners should be advised this may be the case. Ensure good moisture control from now on. Any contamination of the etched surfaces with saliva, blood or water before the splint is placed requires the process of etching to start again.



MaxiTemp™ is applied with a special gun and mixing tip. Layer the material over and between the teeth carefully. Thin multiple layers can be applied every few minutes. It is very important the occlusion of the opposite jaw is taken into account. No composite should be placed buccally or over the cusps of the second and third molars caudal to the lower first molar (canassial) as this will make contact with the upper teeth on closing. Once the splint is placed the occlusion should be checked (this will require extubation if the tube has been conventionally placed) and a mark placed anywhere on the splint the teeth of the opposite jaw make contact. The splint can then be reshaped and the occlusion checked again until there is no contact. Sharp edges on the surface and at the edges should be removed with a high speed diamond bur using water irrigation or an acrylic trimming bur. The surface should be smooth with no areas that catch a latex glove. This is particularly important on the lingual side. Finally, if you have a dentine bonding agent, the splint can be varnished glassy smooth.

Splints will inevitably cause food and other debris to accumulate. Rinsing or brushing the splint daily with a 0.12% chlorhexidine based gel (HS Pet Care Chlorhexidine Paste 115g – 9009502) will improve hygiene and keep halitosis to a minimum. Food must be softened (non crunchy) and all toys withdrawn for the period the splint is in place. It is also wise to review the mouth 3-4 days post op under sedation. Any areas of soft tissue contact from the edges will show ulceration at this point and should be removed. Occlusion can be checked again and the splint cleaned properly.

Healing will take around six weeks in optimum circumstances. Splint removal after healing is relatively easy – especially if a non-tooth coloured composite is used. Section the splint between the teeth with a high speed cross-cut taper fissure bur (701L) and lift the splint off in sections with extraction forceps and an elevator. The teeth should be lightly scaled and polished again at this point. Warn the owner that there will be significant inflammation of the tissues under the splint. This is often called “denture stomatitis” and will resolve in a few days. For that reason it is wise to continue using the chlorhexidine gel once daily with a soft toothbrush.

Cerclage wires

Cerclage wires can be added in some cases to improve retention of the splint to the mandible.

At least one cerclage wire should be placed on each side of the fracture. Prepare the skin of the ventral mandible surgically and introduce the wires from a ventral stab incision. A hypodermic needle can assist as an introducer up the buccal surface of the mandible to enter the oral cavity just below the line where the gingiva meets the oral mucosa – mucogingival junction. The wire is lifted over the splint and placed down the lingual aspect, also just below the mucogingival junction, the exit via the same stab incision. Place the second wire on the other side of the fracture. A layer of composite can be placed over the wires and the mouth closed to ensure correct occlusion before the wires are tightened ventrally. A thin, final composite layer can be placed if necessary.

Step by Step Technique

1 Fracture mid-body mandible between premolars three and four (Figs. 5 & 6).



Fig. 5



Fig. 6

2 Instrument kit – MaxiTemp™ with gun and mixing tip(s), Etch gel, SWG 24 wire with wire cutters and twisters. Hypodermic needle (18g) as introducer. Dyract Prime & Bond™ as final varnish (Fig. 7).



Fig. 7

3 Use of 18g hypodermic needle to introduce wire into interdental space between the first and second mandibular molars below the enamel bulge to improve retention (Fig. 8).



Fig. 8

4 Wire placed lingual and buccal (Fig. 9).



Fig. 9

5 Forming the first loop lingually. The working (buccal) wire is placed in the interdental space assisted by the hypodermic needle if necessary. The wire is placed under and over the static wire to form a loop and run back through the interdental space (Figs. 10 & 11).



Fig. 10



Fig. 11

6 Continue down the mandible using the same technique as far as in necessary. In this case the final loop is placed mesial to the canine tooth. Once the loops have been tightened they can be bent out of occlusion between the teeth (Fig. 12).



Fig. 12

7 Place etching gel on clean teeth. This can be lingual only or lingual and buccal for better retention. The gel is placed for 30-45 seconds on each tooth and then carefully washed off for 15 seconds (Figs. 13 & 14).



Fig. 13



Fig. 14

8 Layer composite over teeth and wire. Soft tissues can be protected by a swab or petroleum jelly (Fig. 15).



Fig. 15

9 Splint before trimming and occlusal adjustment. Note the contact point between the cusp of the upper third premolar and the splint. This must be relieved to allow the mouth to close and prevent destabilisation of the splint (Fig. 16).



Fig. 16

10 Contact point(s) identified and marked with a fibre tip pen before relieving with a high speed diamond bur (Fig. 17).



Fig. 17

11 Second contact point between upper third incisor and splint identified and relieved (Figs. 18 & 19).



Fig. 18



Fig. 19

12 Identify any sharp edges. This is particularly important for those that may contact the tongue. Relieve with a bur or rasp. Protect the soft tissues from accidental damage when doing this (Fig. 20).



Fig. 20

13 As a final step the splint can be varnished smooth with a light cured dentine bonding agent to ensure a smooth surface and reduce the likelihood of traumatic soft tissue contact (Figs. 21 & 22).



Fig. 21

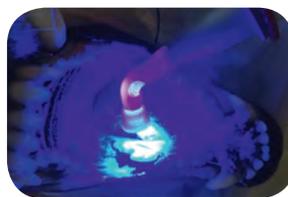


Fig. 22

14 Final image of splint and wire (Fig. 23).



Fig. 23

15 Soft tissue inflammation after splint removal – so called “denture stomatitis” (Fig. 24).



Fig. 24

References;

- Smith MM, Legendre LFJ Maxillofacial fracture repair using non-invasive techniques. In: Oral & Maxillofacial Surgery in Dogs and Cats (2012). Chapter 29, 275-284
- Startup S. (2010) Wire-composite splint for luxation of the maxillary canine tooth. J Vet Dent 27(3):198-202.



Dental Acrylic



DENTAL ACRYLIC STARTER KIT

- ETCHGEL** Etching Compound - Etchgel Phosphoric 40% Syringe 5g plus 3 Tips
- MT2** MaxiTemp HP 'Cold Cure' Acrylic 2 x 50ml Cartridges
- MTMT50** MaxiTemp Mixing Tips - Single Use x 50
- MTPACK** MaxiTemp HP Pack 1 x 50ml Cartridge plus 6 Mixing Tips
- MTG** MaxiTemp HP Re-useable Applicator Gun
- MTSET** Dental Acrylic Starter Kit
(contains 2 x Etchgel, 1 x MT2, 1 x MTMT50, 1 x MTG)

Wire Contouring Pliers



Use to contour both soft and hard wires. The jaw design has multiple anvil shapes and a pair of soft wire cutters.

WIRE CONTOURING PLIERS

- 001245** Wire Contouring Pliers 150mm Long

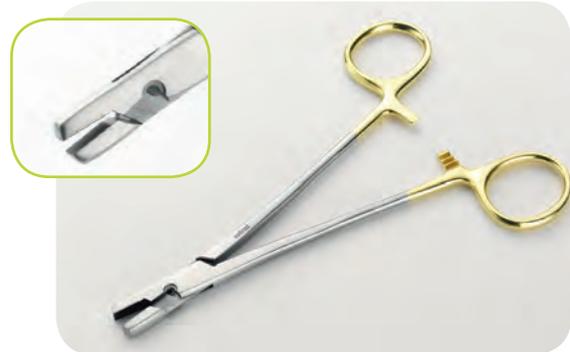
Implant Cutter Surgical Finish to 2.0mm Capacity



IMPLANT CUTTER SURGICAL FINISH TO 2.0MM & 1.6MM CAPACITY

- 001237/1** Implant Cutter Stainless to 2.0mm Capacity Simple Action 255mm Long

Wire Twister/ Shear Cutter



WIRE TWISTER/ SHEAR CUTTER

- 001260** Wire Twister/ Shear Cutter 165mm Long
- 001261** Wire Twister/ Shear Cutter - Tungsten Carbide Jaws 165mm Long (not fenestrated)

Orthopaedic Wire

ORTHOPAEDIC WIRE (IN 10M ROLLS)

OW0410	Orthopaedic Wire	0.4 (Diameter mm)	26g
OW0510	Orthopaedic Wire	0.5	25g
OW0610	Orthopaedic Wire	0.6	23g
OW0710	Orthopaedic Wire	0.71	21g
OW0810	Orthopaedic Wire	0.8	20g

Light curing equipment is available to purchase upon request.

For product specifications and pricing please contact Vi on 0345 130 9596 or email info@vetinst.com

Special thanks to Norman Johnston for the preparation of this guide.

To place an order contact our Vi Advisor Team on 0345 130 9596 or email info@vetinst.com

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