Dental Acrylics and Avian Medicine

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Dental acrylics have been used in avian medicine. The main product contained in many of the dental acrylics available from dental, medical or veterinary suppliers is Methyl Methacrylate. This is a colourless liquid with a sharp, fruity odour. Other products, particularly the cyanoacrylates, have been recommended for avian use. Dental composites are a mixture of resin and inorganic filler. The resin component is either an acrylate monomer or a modified methacrylate (Table 1) [5].

Altman[1,6,7] recommends Cyano-veneer, produced by Ellman International Corp., for beak repairs as the most functional, economical and safest product. It is a cold-curing, fast-setting resin that can be colour-matched to the tissue with a dyed powder. It is made without amine accelerators, giving it colour stability[2]. This product requires no external (ultra-violet) light for curing, is bacteriostatic and relatively inexpensive[1]. In my experience, this product has a variable curing time depending on the proportions of monomer and powder in your mixture. Once it sets it is no longer capable of being moulded but it does form a hard, durable material. Experience and practise will greatly assist you in working with this product.

Light-curing composites are useful in some situations. Their most useful characteristics are:

- they are easily moulded
- will not undergo the curing process until exposed to the correct lighting spectrum - usually ultraviolet light.
- they cure rapidly
- they are useful for filling large spaces

Their major disadvantage is the special lighting equipment needed to effect curing[1]. As well, they cannot be colour matched and so are not as aesthetically pleasing in areas such as a beak.

Self-curing resins are available from dental suppliers. One product (Knead-It) is available from hardware shops and is used by two Avian Veterinary Specialists (Perry and Macwhirter, pers. comm.).

Methyl methacrylate is available in several forms from dental and veterinary suppliers. The main disadvantages are[1]:

- it produces significant heat during its curing process (exothermic reaction)
- it is tissue toxic
- it cannot be colour matched

Applications for Acrylics

1. Surgical Adhesive[1]

- Acrylic can be applied as a drop to tissues after they have been cleaned. The wound is closed/bonded with acrylic instead of suturing
- Closing puncture wound after insertion of microchip transponder

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2. Tissue Surface Protection/Support

- Use of dental acrylic 'shoes' used for protection of foot during healing from pododermatitis[3,4].
- Isobutyl acrylic bandages can be painted onto an area where other bandages are not suitable or the defect cannot be sutured[4,8].
- Acrylic splints[8] for tibiotarsal or carpometacarpal fractures in small passerines (e.g. canary, finches). The acrylic can be painted onto the feathers of the leg or applied to the underside or the carpometacarpus . These fractures are then supported by bandaging as well.

3. Beak Repair [1,6,7,9]
- Fixation of Orthodontic Appliances
- Filling cavities and defects
- Prosthetic appliances

4. Orthopaedic Surgery[10,11]
- Fixation of KE Apparatus joints & Pins
- Biphasic KE Apparatus
- Fill intramedullary cavity for polypropylene rods

Ellman produce a veterinary kit (Ellman Cyano-veneer Repair Kit) that contains many of the components used for beak restoration. The dyes can be mixed and matched to produce a good colour match for the area of damaged beak that has been repaired.

Technique for Beak Repair with Cyano-veneer Acrylic[1]

With a little practice, colour matching can be easily achieved. A dye or combination of dyes are added to the white powder base to achieve the final colour. The powder will deepen in colour when it becomes wet so some experience is useful in determining how much should be added.

Preparing the Tissue

1. Clean and remove all devitalised or flaky tissue.
2. Etch the margin of the wound with a dental burr.
3. Wash and dry the area thoroughly.
4. Apply a small amount of ophthalmic ointment into the eye to provide protection from fumes.

Mixing the Acrylic

1. Use a small spatula or the flat end of a toothpick to thoroughly mix the dyes and powder on a flat surface or mixing pad. Draw a small amount of dye into the powder base and mix before adding more dye as required.
2. Place 2-3 drops of the liquid on the mixing pad about 1-2 cm form the powder.
3. Use the spatula to draw small amounts of the powder mix to the liquid and mix rapidly
4. Mix to achieve a consistency that is creamy and smooth like a syrup or custard.
5. Apply the mixture quickly as curing time will be between 30 and 90 seconds

Applying the Acrylic

1. Apply the acrylic in layers, beginning at the margins, until the defect is filled and the acrylic is slightly protruding above the surface of the surrounding tissue.
2. Allow 5-10 minutes for the acrylic to harden.
3. Curing time can be increased by adding retardant, or decreased by adding accelerant
4. Grind and shape the acrylic to the shape of the surrounding tissues with a low speed sanding disk or fine grinding stone.
5. Apply a thin covering of cyanodent liquid to give a glazed appearance.

Suppliers of Dental Acrylic

These materials are available after some hunting either through veterinary wholesalers or dental laboratories or supply companies. Large amounts are not required and often your local dentist will be happy to supply the small amounts you may require.

Suppliers listed in Coles[5] are a useful starting point, however they relate to 1993. In researching this paper, I contacted several veterinary wholesalers and dental supply companies. The quality of assistance was variable. The most useful source for locating these companies was the Yellow Pages - interstate dental suppliers were helpful and many would fax information.

Table 1. Acrylic Bonding Agents (After Altman[1], 1997 & Coles[5] 1993)

Type	Brand-name	Grade	Manufacturer	Application/Source*
Cyanoacrylates	Cyanodent Cyano-veneer	Ethylcyanoacrylate	Ellman	Beak Repair/Prosthesis Provet
	Tissu-Glu	Isobutylcyanoacrylate	Ellman,	Tissue bond Provet
	Superglue	Methylcyanoacrylate		Commercial Grade. Do not use
Methylacrylates	Temp Plus	Isobutylmethylacrylate	Ellman	Prosthesis Provet
	Hoof Repair	Methyl Methacrylate		Commercial Grade. Do not use
	Vetbond		3M	Tissue bond Vet Wholesalers
	Lang's	Methyl Methacrylate		Amalgadent
Light-curing Bonding Agent	Visiobond		Espe	Regional Dental
	Pertac		Espe	Regional Dental
	Scotchbond 11		3M	Regional Dental
	Heliobond		Vivadent	Ivoclar
Light-curing Composite Resin	Fulfil		Caulk	Conventional filler Dentsply
	Ultrabond		Denmat	Conventional filler Denmat
	Visiofill		Espe	Conventional filler various dental labs
	Heliomolar		Vivadent	Microfilled filler Ivoclar
	Helioprogress		Vivadent	Microfilled filler Ivoclar
	Herculite XR		Kerr	Hybrid filler Regional Dental
	P-50		3M	Hybrid filler Regional Dental
	Perfection		Denmat	Hybrid filler Denmat
	Prisma APH		Caulk	Hybrid filler Dentsply
	Silux Plus		3M	Hybrid filler Regional Dental
	Tetric		Vivadent	Hybrid filler Ivoclar
	Pertac Hybrid		Espe	Hybrid filler Regional Dental
Self-curing Resin	Knead-It	Epoxy & Amine Resins	Selleys	Commercial product
	Concise		3M	Conventional filler
	Marthon		Denmat	Macrofilled filler
	Ultrabond		Denmat	Macrofilled filler
Fibreglass			Selleys , Various	Beak Prosthesis

Source*: these are dental supply companies in Australia. Refer to your Yellow pages in Capital city or interstate.

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