

CLINICAL PRACTICE



Back to Basics: Making a Vacuum-Formed, Custom-Fitted Intraoral Mouthguard Using the "Dry Model" Technique

George Maroosis, DDS

ABSTRACT

For a mouthguard to function properly, it must fit well. It is possible to produce a well-fitting mouthguard using the "dry model" technique, which is relatively inexpensive and easy to learn. Custom-fitted intraoral mouthguards help prevent or reduce the severity of concussions as well as minimize oral cavity injuries.

MeSH Key Words: equipment design; mouth protectors.

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Heat Pressure Technique vs. "Dry Model" Technique

The efficacy of a custom-fitted intraoral mouthguard depends on two factors: the quality of the laminate and the intimacy of the fit. For the mouthguard to function as a shock absorber, it is essential for it to fit properly and to feel comfortable. After all, if the mouthguard is not worn, it will not work.

Currently, many clinicians in the U.S. and Canada are vacuum forming mouthguards to "wet" models, a procedure which does not produce a very good fit. To correct that problem, clinicians have been using a "heat pressure" machine. That machine costs approximately \$4,000 (Cnd.). The "dry model" vacuum machine, on the other hand, costs about \$600 (Cnd.) and produces a fit comparable to the one obtained by the

heat pressure machine. The dry model technique produces a well-fitting mouthguard that is less bulky and has a limited extension, which allows for talking, mouth breathing and reduced gagging.

The purpose of this paper is to provide Canadian dentists with the basic knowledge to fabricate mouthguards using the dry model technique. Dentists have a unique opportunity to provide a valuable service to their community by making mouthguards for school and amateur sports teams at minimal cost.

Materials

There are many different mouthguard laminates and vacuum machines available. This office uses Pro-Form products, which are available in Canada through Ash Temple Limited. Once the basic fabrication technique is mastered, the vacuum

machine can be used with different laminates to create bleaching trays, temporary bridges, etc.

Technique

Alginate is the most commonly used impression material for the fabrication of mouthguards and is the material used in the technique described below. Once the impression is made, the model is poured in coecal stone. The coecal stone is easy to use and hard enough to support the trimming procedures. This is an important characteristic as an accurate model is essential.

When the full arch model has dried, all small plaster bubbles and artifacts are removed.

Using the model trimmer, the base of the model is reduced until a small hole appears in the palate. In the case of a very shallow palate, a hole may be obtained by using an electric drill. The tray of



Fig 1: Model before trimming.



Fig 2: The trimmed model.



Fig 3: Laminate adapted to the model.

the model trimmer is adjusted at such an angle that the periphery of the model can be eliminated, creating a clear path for suction. If this elimination cannot be obtained without damaging the teeth, the edge can be modified using a lab knife.

This wet model is then put aside and allowed to dry completely overnight.

In preparation for vacuum forming, a rubber bowl with a diameter slightly less than the laminate is filled to the brim with ice water. (Ice cubes do not disturb the process.) The laminate is heated and allowed to droop one-half inch, then lowered onto the model and vacuum adapted. If a Pro-Form laminate is being used, a wet finger can help position the insert before the vacuum is activated.

Immediately following the adaptation, the laminate and model are removed from the vacuum machine, inverted and placed into the bowl of ice water. The model will not get wet because the periphery of the laminate is greater than the diameter of the bowl.

The laminate surrounding the model will cool quickly and uniformly. After about one minute, the laminate and model are removed from the bowl of water, and the excess laminate is trimmed to the model using kitchen or lab scissors.

Further trimming to the required periphery of the actual mouthguard is done while the laminate is on the model. This can be accomplished using a Stanley carpenter's knife, or a lab knife heated over a Pieso or Micro Torch flame. The same Pieso torch can be used to lightly heat the

mouthguard periphery to make it easier to round the edge with a wet finger.

Adapting the mouthguard laminate to the dry model gives the intimate and accurate fit.

To facilitate the removal of the mouthguard from the model, the model and mouthguard together are totally immersed in water for about ten minutes. If a clear laminate is being used, the colour of the plaster will change as it becomes saturated. The process can be accelerated by slightly lifting the periphery of the mouthguard.

Once the mouthguard is removed from the model, the margins of the mouthguard can be buffed using a cloth wheel. Pro-Form has a finishing wheel (P390-009) that gives an excellent result.

This technique does not require an extension of the periphery because the retention is provided by the intimate fit to the teeth.

Discussion

This technique is relatively inexpensive and easy to learn, and can be used to produce a quality mouthguard for such sports as soccer, basketball, rugby, field hockey, karate, etc. Custom-fitted intra-oral mouthguards help prevent or reduce the severity of concussions as well as minimize oral cavity injuries. By learning to make proper, custom-fitted mouthguards, dentists can provide a valuable service to their community. There is a great deal of satisfaction involved in doing this type of work, and the public relations value for dentistry in general is enormous. ■

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Dr. Maroosis was chairman of the Mouthguard Committee of the Ottawa Dental Society (1969-71). His work on the committee resulted in the development of a booklet and a series of clinics on mouthguards. He is a member of the Academy for Sports Dentistry.

Reprint requests to: Dr. Maroosis, 9-500 Hazeldean Rd., Kanata, ON K2L 2B5.

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