SMA Southern Medical Association
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23rd Annual Southern Region Burn Conference
Hosted by Firefighters' Regional Burn Center
Marriott Downtown Hotel and Cook Convention Center
Memphis, Tennessee

Old-fashion Fabrication of Transparent Face Masks

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23rd Annual Southern Region Burn Conference
Rehabilitation Seminar: *Southern Recipes for Successful Burn Rehabilitation*
Thursday, November 11, 2010

Old-fashion Fabrication of Transparent Face Masks

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Computerized surface scanning has gained popularity in recent years. The head scanner rotates 360° around the patient's head, painlessly and accurately capturing the profile and contour of the face in 7 seconds. Hand-held laser scanners are now available which create a digital record of the patient's facial surface that is accurate to within one millimeter. The 3-D scan is sent to the company, and a transparent facial orthosis and the patient's face mold are returned within 3-5 days. The scanning process may take just a few seconds, however in addition to the cost for scanning and fabrication; patients incur travel costs as few burn centers are equipped with these scanning systems. Medical technology is great, but sometimes these high-tech devices come with a high-tech price tag.

The following outlines the face mask fabrication technique that I learned 25+ years ago from Mark Covey, OT, at Harborview Medical Center in Seattle, WA. I also trained with Beth Franzen, OT, at Regions Hospital in St. Paul, MN, which I consider the flagship center of face masks. Although there are differences in procedures and protocols used at various burn centers, the basic old-fashion techniques are proven and true, and can provide all burn patients access to well-fitting transparent face masks/transparent facial orthoses (TFO). This skill requires a considerable amount of practice and fine tuning to create a well fitting device.

Step 1: Facial Impression

Supplies: Hair cover (shower cap/bouffant cap)

Petroleum ointment + Vaseline gauze or Xeroform

Jeltrate™ dental impression material or some other type of alginate

Measuring cup (comes in each container of Jeltrate™)

Mixing cups (paper or styrofoam cups)

Small spatula or tongue blades (for stirring Jeltrate™)

Water (work near sink, or have pitcher of water within reach)

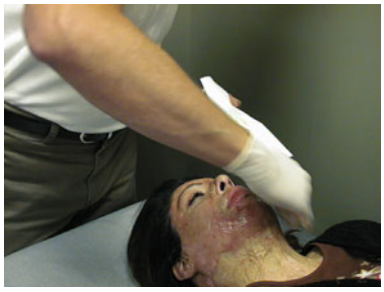
Plaster strips (4 inch wide)

- One long strip measuring the diameter of patient's face, folded lengthwise into fourths (to form outer edge of "bowl")
- Shorter strips, length and width of face

Gloves

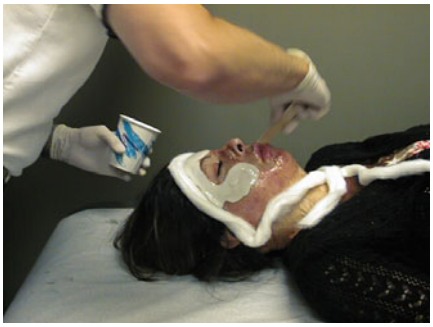
Linens (face cloth, towels, bed sheet)

Procedure:



- Patient positioned in slightly reclined position, but not completely flat (facial contours change when fully supine)
- Cover hair with hair cover/bouffant cap
- Put a thin coat of petroleum jelly over the patient's face and ears if the patient has a lot of facial hair (thick eyebrows or mustache) use a little extra jelly
- Cut vaseline gauze/xeroform into ovals to fit over eyelids for added protection.
- You can also place cotton into the ears to prevent any of the Jeltrate running in them.

- Entire face is covered with Jeltrate™ dental impression material (oatmeal-like consistency)
    - Be prepared → have Jeltrate™ measured out into cups and ready to mix FIRST!



- To allow breathing,
    - Jeltrate™ is not poured over the nostrils or the mouth, OR
    - Patient instructed to breathe through straws placed into nostrils/mouth; fill space around straws with petroleum jelly-lubricated cotton

- Make sure that the patient keeps a "relaxed" face throughout the process or it will make a mold that will not fit later.

- Reinforce Jeltrate™ impression with plaster strips
  - Place long, folded strip first, to form outer edge
  - Use shorter strips lengthwise and widthwise to cover entire impression

- After the plaster has dried (~10 minutes), the impression is carefully removed from the patient's face. Take special care to not tear the Jeltrate™ or disturb the mold. Ask the patient to wrinkle the brow and puff the cheeks to ease the removal of the Jeltrate.

* If not immediately pouring the moulage, be sure to place a damp paper towel into the impression and place entire mold into a plastic bag to keep the Jeltrate™ moist --- if not it dries and shrinks --- and you lose your mold!

Step 2: Fabrication of Moulage

Supplies: Plaster strips (6 inch wide)

Plaster of Paris

Measuring cup

Bowl/bucket to mix plaster

Mixing wand, or plaster drill

Water

Ceramic tools

Fine sandpaper or plaster file

Plastic basin (emesis basin) and towel

Procedure:

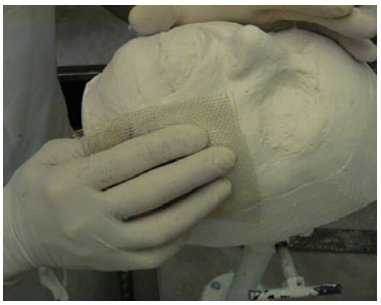
- Create a plaster "bowl" or dam around the negative impression using plaster strips extend the bowl ~2" around the entire area to provide a slightly larger mold then needed if you need to extend into the forehead or behind the ears

- Use the emesis basin and towel to hold the mold gently and prevent the nose from denting when drying. This also supports the area of the mold itself.

- Fill the negative impression with liquid plaster and allow to solidify (~30 min or more)*
    - Tip for plaster to water ratio → fill Jeltrate™/plaster mold with water to rim, pour into mixing bowl
    - Mix plaster slowly into the water (cup at a time)and use your hand to make a thick, smooth batter – try to prevent clumping of the mixture
    - Use 2.5-3x the amount of plaster for ideal consistency for carving
    - Pour a thick slurry into the mold then gently "bang and tap" the mold to allow the air bubbles to escape from the mixture.
    - Place pipe or steel pin into center of plaster if manually pulling face mask.

- Carefully cut the plaster strips and remove from the impression
- Remove the Jeltrate™ as well

- Clean/carve the plaster head and sand smooth- if any holes are present, use plaster slurry to patch these areas and allow hardening prior to shaping and carving.



- Keep a picture of the patients face during the sculpting process to remind you of special areas of attention. Use a marker to draw outlines of the eyes, nose and mouth on the mold for defining areas of greater detail or emphasis.

** If using vacuum former, holes need to be drilled through the eyes of the plaster head during sanding/carving

Step 3: Pulling the Face Mask

Supplies: Transparent thermoplastic material (personal preference for Silon-STS from Bio Med Sciences that is manufactured with a durable silicone lining for enhanced scar compression)

Oven or Flat panel heater

Vacuum former

Leather work gloves

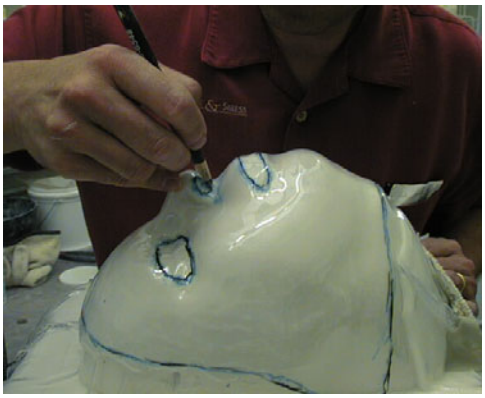
Procedure:

- If using oven method*:
  - Secure pipe or steel pin of moulage into anvil or mounted vice grip
  - Heat the sheet of transparent thermoplastic in the oven until soft and pliable (typically 300-325°F for between 3-5 min). See thermoplastic manufacturer's recommendations for heat setting.
  - The warm plastic sheet is draped over the plaster moulage and manually pulled/pressed over the plaster head.

- If using flat panel heater (FPH) and vacuum former*:
    - Heat the sheet of transparent thermoplastic on the flat panel heater until soft and pliable.
        - Heat setting 325°F
        - If using Silon-STS, heat with the silon side down on the heating source
        - Using leather work gloves, "massage" the thermoplastic to ensure even heating
    - Turn on vacuum former and drape the heated thermoplastic over the plaster moulage, making sure to form a seal around the base. Once sealed, the vacuum will suck the plastic onto the plaster moulage

* During any heating procedure, keep an active eye on the material as it is heating so that you can get a fully heated surface area for the pull. Many ovens will only heat the center and less on the periphery, so you need to watch the material to prevent over heating and bubbling. Sufficiently heated material should have soft, taffy like drape when picked up by hand.

Step 4: Finishing Touches



Supplies: Scissors / Shears

Washable marker

Safety goggles

Dremel tool

Fine sand paper

Strapping material (Velcro, elastic, velfoam)

Rivets
Moleskin

Hammer

Anvil/hard surface for hammering

Procedure:

- Cut outer edge of mask to fit.
- Mark facial features and draw "cut-lines" with marker – first cuts should always be smaller then needed to ensure that the holes are not too large for fitting.
- Use a dremel tool to cut openings in the mask for eyes, nose, mouth and ears
- Smooth all rough edges by sanding and buffing – care should be taken to ensure edges have soft contour throughout
- Attach straps with rivets, place moleskin on inner side of mask that contacts skin

Step 5: Fit Assessment

- The face mask will require periodic modification by spot heating to increase pressure on hypertrophic scars.
- The moulage may need to be further carved to accentuate pressure, i.e. cheeks.

References

Lin JT, Nagler W. Use of surface scanning for creation of transparent facial orthoses: A report of two cases. Burns 2003, Sept;29(6):599-602.

Locke S, Smith S, Szeliski-Scott B, Lemaire ED. A clear polycarbonate face mask for the treatment of hypertrophic scars. Journal of Prosthetics and Orthotics 1991;3(4):182

Rivers EA, Strate RG, Solem LD. The transparent face mask. American Journal of Occupational Therapy 1979 Feb;33(2):108-13.

Shons AR, Rivers EA, Solem LD. A rigid transparent face mask for control of scar hypertrophy. Annals of Plastic Surgery 1981 Mar;6(3):245-8.

Websites:
http://www.regionshospital.com – Face Masks

http://www.silon.com

http://www.totalcontact.com/patients.html

http://www.hanger.com/orthotics/services/pages/burntreatment.aspx