

AN EVALUATION OF NEW MEMBRANE PATCH  
FOR OCCLUSION AND PRESSURE PATCHING

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Patching of an eye is fairly common place in an optometric office, and currently there are many methods and techniques to accomplish this, each with it's advantages and disadvantages. In this paper we intend to show the reader a new method of patching that utilizes vapor-permeable membranes (VPM's) which may have advantages that no other patch now available may offer. This paper will give a short history of common patches used today along with some of the advantages and disadvantages of each. Also we will introduce a new patch and tell why this patch may have advantages no other patch has. There will be several case reports using VPM patches and directions on how you the practitioner and your patients can make this patch.

Two of the most important reasons why an eye care practitioner would patch an eye are occlusion to improve or keep the same level of visual acuity in an amblyopic eye(1) and to protect the eye after trauma in the form of foreign body, abrasion or an erosion.(2)

#### OCCLUSION

Patching is the most common form of amblyopia therapy and has been used since the 18th century.(3) Constant, total patching is the most effective type of occlusion.(4) However, this requires cooperation from the patient; therefore, it can be difficult to implement.

One of the methods used to acquire occlusion is translucent adhesive tape applied to spectacle lenses. The tape is hard to detect by an observer at a distance yet, the patient's eye is still perceptible at close range. The patient is unable to view any form imagery through the tape, thus providing the occlusion. The tape is readily available, easily applied and can be removed without altering the property of the lens. Other types of spectacle lens occluders include clip-on occluders, paste on novelty occluders and black-out felt booties that slip over the spectacle frame. All of these methods have the disadvantage of allowing for some "peeking" around the patch, but this is somewhat discouraged, but not eliminated with the felt booty.(5)

Other forms of occlusion include a "pirate" patch in the form of an eyepatch with an elastic headband. This method decreases the likelihood of "peeking" but may be easily removed by small children. Perhaps the most cosmetically acceptable method of occlusion is to fit the patient with an opaque pupil or high plus fogging contact lens. This method may minimize psychological apprehension during the adaptation phase, but may not be an adequate attenuator to change the fixation pattern in a deep amblyopia.(5)

The most common method of occlusion is the adhesive eyepatch, available in several commercial types. Coveret(tm) and Opticlude(tm) come in boxes of 20 and are available in pharmacies. Although Opticlude patches are hypoallergenic they can still be irritating to the skin. These patches may also

fall off if they become dirty or if perspiration or other moisture is exposed to or under the patch. These problems may be reduced or eliminated by securing a piece of gauze to the eye with a vapor-permeable membrane (VPM) made of polyurethane such as 3M Tegaderm(tm).

VPM's were designed to be used as a dressing for IV catheters, minor abrasions, superficial pressure ulcers, skin graft donor sites and closed clean surgical wounds.(6) In a study done at St. Margaret Hospital in Hammond, Indiana(7), Blisterfilm(tm), a VPM, used for a dressing at catheter exit sites showed the most comfort and allowed patients to shower without having to change the dressing. The study also showed that VPM lifted off the skin easily and that no significant irritation ever developed. VPM's are permeable to water vapor, oxygen and carbon dioxide yet impermeable to bacteria and water.(7) This allows perspiration to pass out from under the membrane which helps keep the membrane adhered to the skin while still allowing the skin to breathe. This may reduce irritation. Another study from the Netherlands found polyurethane dressings pose a distinct antimicrobial activity against the skin flora.(8) In the same study, zero out of 40 unimpregnated dressings, like Tegaderm, placed on the inner forearm for seven days had lost adhesion to the skin.(7) All of these attributes of VPM's may make them a better material for an eyepatch.

## DISCUSSION

Occlusion therapy of the fixating eye is common practice to improve visual acuity in the amblyopic eye. For whatever length

of time occlusion is attempted, constant and total patching during the occlusion phase is preferable to partial blurring techniques in breaking deep amblyopia.(4) Adhesive patches are the most common and may be the most effective way to achieve this type of occlusion. Although there are several commercial patches on the market, the eyecare practitioner and patient may be able to make a better patch with the use of a piece of gauze secured to the eye with a VPM. Because of the characteristics of the VPM this patch may stay on the eye better and cause less irritation to the skin allowing for longer and more effective amblyopic treatment.

#### OCULAR HEALTH:

A tight patch (pressure patch) is common treatment for an eye that has had trauma from foreign body, abrasion or an erosion.(2) The goal of a patch is to help the epithelium of the cornea heal by reducing the interference from the movement of the upper lid when blinking. This is most often done by placing a gauze eyepatch in the eye socket over the closed eye, held tightly in place with adhesive tape. This type of patch can be very unattractive, slow and tedious to apply, and painful to remove.

The same qualities that make VPM's useful for occlusion patching also make VPM's useful for the pressure patching of an eye. The characteristics of VPM's being permeable to water vapor, oxygen and carbon dioxide yet impermeable to bacteria and water(6) allows the person in need of pressure patching to sweat, shower,

sleep and keep the patch on for over 24 hours without removal or irritation.(7) VPM's also have an intrinsic antimicrobial effect(7) which can augment any antimicrobial agent used with the pressure patch. VPM's are made out of clear stretchable polyurethane material allowing the patient's natural skin tone to pass through, making the patch less noticeable, while placing more pressure on the eye to reduce the chance of blinking under the patch. It may also be removed with less discomfort. These benefits may make a pressure patch secured to the eye with a VPM an excellent alternative to one secured with adhesive tape.

#### CASE REPORTS:

##### CASE 1

A 36-month old female presented with a right esotropia with hyper caused by a fourth nerve palsy due to damage done during brain tumor removal surgery. Cover testing showed a 35 eso with 10 hypertropia of the right eye. Visual acuities were not accurately obtained but were believed better than 20/40 in each eye. Direct patching therapy to prevent amblyopia was attempted by use of 3M Opticlude(tm) junior size patches.

Opticlude patches either fell off or were pulled off shortly after application to the patient's eye. Patching with gauze secured with 6cm X 7cm 3M Tegaderm(tm) sterile dressing was started daily. This patch was used successfully, in the fact that it did not fall off even after swimming and the patient had less of a tendency to try to pull the patch off. The VPM patch

was easy to apply and remove with little discomfort. After one and a half years, the patient is still wearing this patch for 4-5 hours 6 days a week without ever developing any irritation.

#### Discussion

As this case shows, although Opticlude may be successful for some or even most patients, the patch secured with Tegaderm may stay on better and allow for more normal behavior especially for younger patients, and greatly increase the success of the therapy.

#### CASE 2

A 27-year old male presented to an Optometric office complaining of pain and injection of his right eye after a piece of rust had fallen into his eye while working under his car. Visual acuities were 20/20 in each eye. A small piece of metal with rust ring below the visual axis on the right cornea was found upon examination with a biomicroscope.

The particle was removed with a spud and a small rust ring was removed with an Alger brush. A one inch bead of Polysporin(tm) ophthalmic ointment was placed in the lower cul-de-sac of the right eye. A pressure patch was applied to the eye using gauze eye patches and secured with a 10cm X 12cm 3M Tegaderm(tm) sterile dressing. The patient was told he could shower, sleep and was warned about the loss of depth perception while being monocular. The patient returned to the clinic the following morning with the patch still intact and adhered to his face and

forehead. There was little discomfort upon removal of the patch and re-epithelialation where the foreign body had been was complete.

#### Discussion

The patch performed well, providing protection to a compromised eye. The use of a clear polyurethane dressing allowed this patient to continue a more normal life while patched. The patch also let the patient's normal skin color pass through allowing the patch to be less conspicuous than one secured with white adhesive tape.

#### HOW TO MAKE PATCHES USING VPM's

To make an occlusion patch, use a 1.5in X 2in sterile gauze and 6cm X 7cm 3M Tegaderm(tm) sterile dressing. Open the package and remove the sterile dressing. Remove and discard center cut-out window (tan). Peel the paper liner (white) exposing the adhesive service and leaving the framed dressing. Place the gauze in the center of the dressing on the adhesive side. Place the dressing over the eye to be occluded and remove the remaining paper frame while smoothing down the dressing. To remove a patch, gently grasp the edge of the dressing near the nose and slowly remove. This will minimize hair loss and discomfort.

To make a pressure patch, treat the eye as you pharmacologically would normally (ointment/drops) and use a sterile oval eye pad and a 10cm X 12cm 3M Tegaderm(tm) dressing. Remove the center cut-out window and the adhesive backing as in the occlusion

patch. Place the eye pad on the adhesive surface with the long chord of the oval pad across the short distance of the window. Place the dressing over the eye so the eye pad covers the eye, (an additional eye pad may be folded and placed in the eye socket to increase the pressure on the eye). Try not to get hair under the dressing. Remove the remaining paper frame and smooth down the patch. To remove a patch start near the upper middle corner and slowly pull off.

3M Tegaderm is available from most medical suppliers or from the 3M Medical-Surgical Division, St. Paul, MN 55144-1000.

#### SUMMARY

Amblyopia occurs in approximately 2% of the general population,(9) and pressure patching is standard treatment after eye trauma.(2) This tells us that patching is common for the optometric practitioner to do or prescribe. Constant, total patching is the most effective type of occlusion for amblyopic therapy.(4) This is accomplished most practically by the application of adhesive eyepatches;(5) however, since this method requires the cooperation of patient, parent and practitioner, patching therapy can be difficult to implement.(3) The standard gauze and adhesive pressure patch sometimes is difficult to apply, unattractive and may limit the activities of the patient with a pressure patch.

The characteristics of VPM's may improve the efficiency of both the occlusion and pressure patch. The ability to let water vapor, oxygen and carbon dioxide to pass through the membrane while blocking the passage of bacteria and water(7) may help both patches adhere better to the skin and allow for greater normal patient activities, even swimming and bathing. The intrinsic antimicrobial effect of VPM's(8) may reduce the risk of infection of the patched eye. The VPM's ability to stretch allows them to move with the movements of the skin, this can help them stay adherent and also place more pressure on the eye than a standard pressure patch thus reducing the chance of blinking. Lastly, VPM's are made out of a clear polyurethane material which allows the patient's natural skin color to pass through the patch, thus making them cosmetically more appealing.

Although the use of VPM's for patching may not be the method of choice for all patch patients, the characteristics of the polyurethane membrane has advantages that may make it the method of choice for many of our patients because of better effectiveness and compliance.

## REFERENCES

1. Griffin, J., Binocular Anomalies Procedures for Vision Therapy. New York, Fairchild Publications, 1988, p. 195.
2. Bartlett, J., Clinical Ocular Pharmacology. Boston, Butterworth Publishers, 1989, pp. 601-605.
3. Stager, D., Amblyopia and the Pediatrician. Pediatric Annals., 1990, 19(5) pp. 301-315.
4. Jampolsky, A., Unequal Visual Inputs and Strabismus Management: Comparison of Human and Animal Strabismus. Helverston, E.M. (ed.), Symposium on Strabismus, St. Louis, C.V. Mosby Co., 1978, p. 401.
5. Press, L., Methods of Occlusion in Amblyopia. Optometric Monthly., January 1982, pp. 9-13.
6. 3M., Tegaderm Transparent Dressing Package Insert., St. Paul, 3M Corporation.
7. Moore, C., Comparison of Blisterfilm and Gauze for Peritoneal Catheter Exit Site Care. ANNA Journal., 1989, 16(7) pp. 475-489.
8. Wille, J.C., A Comparison of Four Film-Type Dressing by Their Anti-Microbial Effect on the Flora of the Skin. Journal of Hospital Infection., 1989, 14 pp. 153-158.
9. von Noorden GK. Burian and von Noorden's Binocular Vision and Ocular Motility. St. Louis, MO: CV Mosby Co.; 1974, p. 220.