Contact lenses in the emergency room

Kent Hein

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Abstract

Eight hospitals in the Portland, Oregon Metropolitan area were surveyed with respect to techniques utilized by emergency room personnel in identifying patients wearing contact lenses and the subsequent removal and storage of these lenses. Hospital sizes ranged from 48 beds to 554 beds. In general, the results indicated that the single weak area in lens detection, removal, and storage for hard and soft lenses, is the lack of information with respect to soft lens storage solutions. Appropriate soft lens storage procedures were not known by all hospitals. Emergency room directors of smaller hospitals stated however that few, if any, individuals wearing contact lenses (hard or soft) were seen in an emergency room setting. Results of the survey also found that having contact lens wearers be identified as such on their driver's license would not necessarily facilitate operations of the emergency room personnel since law officials at the accident site often temporarily kept these driver's licenses.
The contact lens has been rapidly integrated into the eye care profession. In addition to cosmetic appeal and the optical advantages, it may be considered the method of choice in the treatment of aphakia, refractive anisometropia, aniseikonia, keratoconus, low vision, myopia control and the soft lens may also be used therapeutically by physicians. Fitting procedures are changing while lenses are changing in design and material, allowing a larger percentage of the population to be successfully fit (Mandell, 1974).

The contact lens patient has an area of vulnerability that the eye care profession cannot completely protect. An accident or medical emergency that renders the patient unconscious or unable to inform persons concerned that the lenses should be removed, is such a situation. It then becomes someone else's responsibility to detect, remove and store the lenses. The emergency room in a hospital where initial life saving measures are administered exemplifies the situation where other individuals may have to take responsibility in detecting, removing and storing the contact lenses of a disabled or comatose patient.

Platt (1973) has noted the significance of emergency room personnel being trained in the removal of contact lenses. His eleven year old daughter sustained a concussion in an auto accident and hours later he learned that the contacts had not been removed. Individuals present in the emergency room were
not capable of removing the lenses, so he did.

Detection of the presence of a contact lens when communication with a patient is impossible may consist of several steps. For example, initial detection for the presence of a lens may consist of searching for some form of identification worn by the individual. Recently, the Kansas State Division of Motor Vehicles and the Kansas Optometric Association have started distribution of red labels affixed to driver's licenses of contact lens wearers to facilitate identification. Upon location of such a label, certification of the actual type of lens then follows. If no identification is present, Dunn (1975) suggests separating the patient's eyelids and shining in a small penlight from the side in order to detect the presence of a lens.

The lens to be detected may be one of three basic types. The scleral lens is used least and is about the size of a quarter. It may be tinted or clear, overlapping onto the sclera (normally forming an air pocket under the lens) and its edges can be seen in the nasal and temporal canthus (Gould, 1976). A second basic type of lens is the soft lens. It is 12 to 16 mm. in diameter, clear, and may overlap onto the sclera (Gould, 1976). Since some of these lenses extend from limbus to limbus, more than a cursory glance is required in order to detect the lens. The corneal or hard lens is the most common type. It is smaller than a dime (6.5 to 10.5 mm.) and is usually tinted. Gould notes that this type of lens is displaced from the cornea more
easily than the soft lens and may require a search of the fornix and recentering before removal.

Removal of the contact lens may be done manually or with a device. The soft lens currently has no commercially designated device. Bayshore (1972) however has proposed using a short piece of polyethylene tube that has one end clipped with curved scissors at a 60 degree angle. The end is then smoothed. The remover tip is used to slightly depress the sclera adjacent to the lens, which is partially slid onto the tube, and then removed as a single piece.

The corneal and scleral lenses may be removed with suction cup devices, although a larger size suction cup may be needed for the larger scleral lens (Beyers and Dudas, 1977). The suction cup has a bulb that provides suction, but it does require some dexterity. Another alternative is the DMV, designed by England. This is a rubber cup that only requires placement on the lens to provide suction (Platt, 1973). Another method noted by Stevens (1972) modifies the suction cup and can be used for fenestrated lenses. His technique uses the mouth for suction rather than a bulb, which is currently used on volumetric pipettes. This method is also recommended for soft lenses but Gould (1976) disagrees with this recommendation of using a suction type of remover for soft lenses. However, not all authorities feel this way (Kerns, 1979).

There are two manual removal methods for the soft lens, but in either case, the lens should initially appear slippery
on the cornea. If this is not the case, the lens should be moistened with normal saline or epithelial tissue is removed with the lens (Gould, 1976). However if the patient is responsive, a method similar to one used with hard lenses can be utilized. Here Cawrse (1973) suggests placing one index finger on the upper lid margin, and one on the lower, holding the lid margins against the lens edges, having the patient look nasally and bringing the lid margins together. If the patient is not responsive, the upper lid is pulled superiorly and the lens is then pinched off with the fingers of the other hand (Gould, 1976). Bayshore (1972) comments that the lens may be moved to the sclera before pinching to prevent possible damage to the lens or cornea.

For manual removal of the scleral lens, the patient should be responsive. Here "the patient, if responsive, is instructed to look downward when scleral lenses are removed to avoid possible abrasion of the cornea. In manual removal, the examiner's index finger is positioned near the edge of the lower lid. The lid is then slowly and carefully slid back to reveal the edge of the lens. Moving the finger away from the patient's nose and pulling the lid taut causes the lid to slide under the lens, thus making the lens lift out so that it can be grasped and removed" (Beyers and Dudas, 1977, p. 1005).

Gould (1976) states that to remove a hard lens, the thumb or finger is placed on the upper eyelid, directly at the margin, and the lid is then raised. Correspondingly, the thumb or
finger of the other hand is placed on the lower lid, at the margin, and the lid is lowered. The eyelid is prevented from curling by placing the fingers at the base of the eyelashes, and then bringing the eyelids slowly together. The lens is subsequently trapped between the lid margins, which breaks the tear layer adhesion of the lens, ejecting it outward with continuing lid movement.

If removal of the contact lenses cannot or should not be attempted, or if the presence of lenses cannot be ascertained, Luckmann and Sorensen (1974) recommend that personnel place a piece of adhesive tape on the patients forehead which says "CONTACT LENSES". Additionally, if hard corneal lenses are detected but not removed, they may be decentered from the cornea as such lenses can rest for at least 24 hours in the cul-de-sac without causing damage (Manchester, 1965).

After the lenses are out, they must be kept in separate containers that are labeled as to right or left eye. The hard and scleral lenses are best stored in a commercial soaking solution. If no solution is available, saline or distilled water also work well (Gould, 1976). The lenses may, if necessary, be stored dry without harm (Mandell, 1974).

The soft lens, however, requires more attention. They are best stored in normal saline which is commercially available. Hospital saline may contain the preservative chlorobutanol which binds to the lens (Evans, 1973), and should not be used. Both lathe-cut and spun-cast lenses can be stored dry if no
saline is present as they rehydrate nicely. The dehydrated lens resembles a cornflake in appearance and fragility, so care in handling is required.

Although the contact lens wearer is increasing in frequency today, little work has been done in ascertaining the role that contact lenses play in hospital emergency room procedures. Therefore, the purpose of the present project is to survey hospital emergency room personnel and determine the methods of contact lens detection, removal and storage utilized.

Method

Subjects

Eight hospitals in the Portland, Oregon Metropolitan area participated in the survey. All of these hospitals contained emergency room facilities. Bed capacity was used to classify the hospitals into three classes: large (L), 450 to 560 beds; medium (M), 110 to 250 beds; and small (S), 40 to 60 beds. For reporting purposes a letter code was used to identify the participating hospitals. Two large hospitals (EL and VL), four medium hospitals (KM, JM, GM, and TM) and two small hospitals (FS and NS) participated in the study. Two additional hospitals were contacted but declined to participate.

Materials

A questionnaire was constructed to check the various aspects of contact lens care. Initial interviews indicated some survey questions were inappropriate and these questions were subsequently omitted in the study. A copy of the questionnaire is
presented in Appendix A.

Procedures

Initial contact with the hospitals was made via letter. See Appendix B. The author then made telephone contact to establish specific interview times.

Results and Discussion

Questionnaire responses for each hospital were categorized and these results are presented in table 1.

Insert Table 1

Checking for printed contact lens identification in purse or wallet was not done routinely at five hospitals; KM, TM, CM, FS and NS. Hospital VL did check routinely, and JM and EL checked for possible identification when a patient was extremely sick or unconscious. Hospitals JM and NS also mentioned checking medic alert identification tags. Verbal information from the patient was utilized by all hospitals and the patient was encouraged to remove the lenses if possible.

The physical inspection for contacts was part of the pupil reflex examination at all hospitals. The director from VL said that concern over contact lens detection was important but may be overlooked in emergency room activity.

Five hospitals (VL, KM, TM, FS and NS) stated that all personnel could remove contact lenses. One hospital (VL) commented that most emergency room personnel could remove the lenses, but that staff members that wore contact lenses usually
handled the lens removal procedures. Hospital GM used physicians
to remove soft lenses, but reported that all staff could remove
hard lenses. Hospital JM also reported that most personnel
could remove contacts, but staff physicians often removed them.

In general, the method of removal for hard lenses was the
DHV. The only exceptions to this condition were hospital GM
which used a suction cup and hospital KM which used manual
methods about 95% of the time, and the DMV on the remaining 5%.
The original soft lens questions (see Appendix A) were changed
somewhat in emphasis during the actual interviews due to their
relatively recent appearance on the market and low frequency
of appearance by patients in the emergency room. Five hospitals
(EL, TM, GM, JM and FS) removed soft lenses manually. Hospital
NS was unfamiliar with the procedure. Hospitals VI and KM
preferred to use the DMV for removal, but could also remove
the lenses manually.

Scleral lenses were judged uncommon at six hospitals
(VL, EL, KN, TM, GM and JM), all related questions were then
deleted. Decentration was not used in any hospital.

Four hospitals (VL, EL, JM and NS) stored hard lenses dry
while two (GM and FS) utilized commercial solutions. Hospital
KM used saline or water and hospital TM used water. Hospitals
VL, GM and FS used commercial containers while the rest used
pill containers or bottles that were labeled "right" and "left".

Similar findings were discovered in soft lens storage.
Hospitals VL and FS had commercial containers and stored the
soft lenses in a commercial solution. Three hospitals (KM, TM
and GM) used noncommercial labeled containers and saline, while hospital JM used similar containers and no storage solution. Hospitals EL and NS were unfamiliar with the soft lens storage procedure. This lack of familiarity may be due, in part, to the previously mentioned low frequency of such emergency contact lens patients. As previously noted, most lenses are of the hard corneal type and soft lenses are recent in development.

The survey question, "Possible routine modifications", yielded a good idea from hospital KM. This hospital stressed that lenses should not be removed if the patient prefers, since lens removal may create a disturbing or fearful environment because the patient would be deprived of corrected visual acuity.

Another survey question, importance of "Standardized Contact Lens Identification", gave varied but interesting results. With respect to the Kansas method of identification stickers on the driver's license, six hospitals (EL, VL, JM, GM, FS and NS) felt such a method would be beneficial, while TM and KM did not respond in a positive manner. However it must be remembered that not all hospitals examine the driver's license and that law officers may temporarily retain the driver's license.

In summary, all hospitals seemed highly effective in lens detection while checking the pupil reflex. Printed identification as a contact lens wearer did not appear to be critical, though the existence of such a uniform identification system might generate such utilization. Removal of the hard lens was generally with a DMV, with one hospital (EL) preferring manual and another (GM) using a suction cup. Soft lens removal generally
was done manually with two hospitals (VL and KM) also using a DMV. Though storage containers were generally noncommercial, they were adequate. Hard lens storage solutions were saline, commercial, water or dry. Soft lens storage also varied from dry to saline or commercial solutions. The soft lens storage procedures seemed to be the only weak area as two hospitals were unfamiliar with the process. The personnel were very capable in handling a contact lens patient. Lack of familiarity with recent procedures seemed the only problem, but hospital emergency rooms appeared to be well prepared for disabled or comatose contact lens wearers. Finally no consistent differences in contact lens detection, removal and storage techniques based on hospital size were found.
Appendix A
1.) What are procedures used in contact lens detection, removal and storage?

**Contact Lens Detection**

2.) Identification check?
   - driver's license?
   - contact lens identification card?
   - other?

3.) Verbal confirmation?
   - person with patient?
   - patient?

4.) Physical inspection?
   - with penlight off to side?
   - direct illumination?
   - other?

5.) What is routine or preferred?

**Contact Lens Removal**

6.) Removal is routine?
   - all can do?
   - most can do?
   - someone present can do?

7.) Removal by someone outside of emergency room?

8.) Method of removal for hard lens?
   - suction cup? __% for conscious __% for unconscious
   - DNV? __% for conscious __% for unconscious
   - manual? __% for conscious __% for unconscious
   - other?

9.) Method of removal for soft lens?
   - pinch from cornea?
   - decenter and pinch from cornea?
   - other?

10.) Removal of scleral lens?
    - common or uncommon?

11.) Decentration?
    - for removal?
    - for removal in future?

**Contact Lens Storage**

12.) Hard lens
    - dry-water-saline-commercial-other?
    - commercial container-other?
    - right and left labeling?

13.) Soft lens
    - dry-saline-commercial-other?
    - commercial container-other?
    - right and left labeling?

14.) Possible routine modifications?

15.) Importance of standardized identification?

16.) Unusual events?
Director
Emergency Room Services
Hospital
Portland, Or.

Dear Doctor:

The Department of Psychology at Pacific University is working with the Pacific University College of Optometry in surveying the methods and techniques emergency room personnel utilize in identifying patients who wear contact lenses, what type (hard or soft) of lens is worn, and how the lens is removed or displaced. We are also interested in learning if emergency room personnel believe that, having contact-lens wearers wear some identification as to this matter, their job would be facilitated. For example, some states have the contact lens wearer be identified as such on his/her driver's license.

With your permission, I would like to have Mr. Kent Hein, a fourth year optometry intern at Pacific University College of Optometry, contact you with respect to the survey.

Thank you in advance for your assistance.

Sincerely,

Steven L. Beedle
Assistant Professor of Psychology

SLE/rmt
References

Bayshore, C.A. Design for a Soft Contact Lens Remover. Optometric Weekly, June 1 1972, 63(22), 558-559.


Table 1
Survey Results of Contact Lens Procedures
Used by Portland, Oregon Metropolitan Area Hospitals

<table>
<thead>
<tr>
<th>Procedures</th>
<th>Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customarily check identification</td>
<td>VL  EL  KM  TM  GM  JM  NS  FS</td>
</tr>
<tr>
<td>Pupil reflex check</td>
<td>Yes  Yes  No  No  No  Yes  No  No</td>
</tr>
<tr>
<td>Proportion of personnel that removes lenses</td>
<td>All  Most  All  All  All*  Most**  All  All</td>
</tr>
<tr>
<td>Hard lens removal</td>
<td>D    D    D&amp;M  D    D    D    D    D</td>
</tr>
<tr>
<td>Hard lens storage container storage solution</td>
<td>cc   d    o    s&amp;w  o    cc   o    o    cc    cs</td>
</tr>
<tr>
<td>Soft lens removal</td>
<td>D&amp;M  M    D&amp;M  M    M    M    M    NF  M</td>
</tr>
<tr>
<td>Soft lens storage container storage solution</td>
<td>cc   NF   o    s    o    o    o    NF  cc    cs</td>
</tr>
<tr>
<td>Standardization of identification</td>
<td>Yes  Yes  No  No  Yes  Yes  Yes  Yes</td>
</tr>
</tbody>
</table>

Key
- D = DMV
- M = manual
- cc = commercial container
- cs = commercial solution
- d = dry
- s = saline
- NF = not familiar
- w = water
- * staff physicians do soft lenses
- ** staff physicians often do