Modified ERG-jet contact lens electrodes for use in infants and toddlers

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Abstract. A simple modification of the standard ERG-jet contact lens recording electrode for use in infants and small children was developed. A small Plexiglas cylinder is fixed to the front surface of the electrode, which prevents lid closure and facilitates handling. Sedation or general anesthesia is rarely needed. Waveforms obtained with the modified electrode appear comparable to those obtained with standard electroretinogram electrodes.

Introduction

The choice of an electroretinogram (ERG) electrode for routine clinical use remains problematic. Standard designs, such as the Burian-Allen speculum electrode, are justifiably popular, with excellent mechanical and electrical characteristics, but they are not without drawbacks. For example, these lenses are very expensive and have been subject to lengthy back-orders. The standard lenses sized for adults are often too large to insert in the eyes of infants, requiring the purchase of electrodes in two or three sizes if small children are to be studied. In many laboratories, it has been thought that sterilization of the electrodes between uses is unnecessary and impractical. However, reports of the recovery of infectious human immunodeficiency virus particles in tears have led to reservations about this approach, notwithstanding the fact that no case of human immunodeficiency virus transmission has been reported via tears.

One popular alternative has been the ‘ERG-jet’ electrode (Universo S.A., La Chaux-De-Fonds, Switzerland), designed by P.A. Grounauer. These disposable, single-use contact lens electrodes are supplied in sterile bubble-packs, at a cost of about $10.50 (U.S.) each. In many cases, particularly with cooperative patients, insertion of these small electrodes is much less traumatic than the use of a larger electrode with a more massive lid speculum. Four small protrusions (Fig. 1) are molded into the front surface of each lens to discourage closure of the eyelids over the lens, which would, of course,
Fig. 1. Standard ERG-jet contact lens electrode (far left) and modified contact lens electrodes for use in infants and small children. The small Plexiglas cylinders prevent closure of the eyelids over the lens, even with vigorous lid clenching, and facilitate insertion in uncooperative subjects. The solid cylinder (second from left) is permanently glued to the contact lens. The hollow cylinders (second from right and far right) are held between the lens protuberances by friction and are reusable.

greatly impair the effectiveness of the flash stimulus used for ERG recording, as well as substantially increase the discomfort of the patient.

Notwithstanding the assurances printed on the box, this 'blepharostatic effect' is not reliable in infants and small children, who frequently clench their lids over the electrodes despite the restraining protrusions, thus exacerbating their discomfort and anxiety over the ERG procedure, and frequently leading to lid spasm sufficient to prevent satisfactory ERG recording. With patients younger than 4 or 5 years, verbal instructions to 'relax' and 'keep your eyes open' are rarely effective.

We have developed a modification of the ERG-jet contact lens electrode to facilitate recording of the ERG in unanesthetized infants and small children.

Materials and methods

A small cylinder of Plexiglas, 0.3 inches (0.76 cm) long, is machined from standard 1/4-inch-diameter (0.64-cm) stock. At one end, the edge is smoothed; at the other end, a small concavity is machined, to match roughly the convexity of the outer surface of the ERG-jet contact lens (radius of curvature, 5/16-