Reducing Muscle Artifact During Evoked Potential Testing

By Chris Slaymaker, R. EEG/EP T., CNIM

There has been much talk regarding sedation alternatives in the neurodiagnostic lab. In the ASET September 2006 newsletter, there are two articles (“Alternatives to Sedation in the EEG Lab” by Steve Bild, R. EEG/EP T., CNIM and “Sedation Alternatives for Obtaining EEG Recordings” by Vonda Dickson-Gardiner, R. EEG/EP T., CNIM) in the Tech Tips section (Vol. 30, No. 3, pages 14 – 15, 18). In the December 2006 issue of the American Journal of Electroneurodiagnostic Technology (AJET) (Vol. 46, No. 4, pages 343 – 355), there is an article reprinted from the Journal of PeriAnesthesia Nursing comparing the use of chloral hydrate to music therapy.

In the AJET article titled “Sleep/Sedation in Children Undergoing EEG Testing: A Comparison of Chloral Hydrate and Music Therapy” by Loewy, Hallan, Friedman, and Martinez, much of the discussion offered music therapy as a viable alternative. Music therapy consists of a licensed music therapist in the laboratory, playing soothing music on a guitar and perhaps also a percussion instrument. The primary advantage to this technique is that the music can be selected by the individual, and the tempo can be adjusted to the patient’s own breathing rhythm as needed. Certainly this has advantages over prerecorded music (often of a tech’s own choosing) that may not be suitable for the situation at hand and is difficult to change as the need arises. This article cited a 97% effectiveness of music therapy versus a 50% effectiveness for chloral hydrate. Much of this study was geared toward pediatric and neonatal patients undergoing EEG testing, who are nervous in almost any unfamiliar situation.

This Tech Tips article addresses patients undergoing evoked potential testing, who are nervous to begin with (which in the case of neurodiagnostics is much of the population – not just pediatrics). When a test/procedure is ordered “with sedation,” the assumption is that some drug will be administered. These days, pharmacological sedation is difficult to obtain, much less to administer, due to the risk management hoops one must jump through. When a visibly nervous patient comes to you for neurodiagnostic testing, what are you going to do to insure good results? Much of this may be obvious, but I will enumerate some important points.

First of all, consider first impressions. What the patient first sees will often determine how they deal with the current situation. This includes yourself as well as your surroundings. Smile! The lab may be designed to be a “sterile” environment, but the “homey” touch goes a long way towards putting someone at ease. Use incandescent lighting whenever possible. When testing inpatients, I will take the test to the patient (rather than having the patient transported to the lab) so that they feel that the test is being done on their own terms (see below).

Second, put yourself in your patient’s shoes. How would you like to be treated? A person is most at ease when they feel they are in control of the situation. Before you touch the patient (short of a handshake) make sure the patient knows who you are and what they should expect during the test.

The patient should know:
- that you are credentialed (if that is the case) and how long you have been in the profession (are your credentials displayed prominently?).
- how long the test will take.
- the specifics of the test procedure – this is a test of function, not form, and is based on the premise that all the nerves in the body are connected to the brain (at least they should be).

Third, your patient should understand the rudiments of neurodiagnostic testing, which are as follows:

1. Tiny signals are recorded from the brain and nervous system by way of electrodes placed on the surface of the body.
2. Nerve signals are measured in microvolts (one millionth of a volt).
3. Muscle signals are measured in millivolts (one thousandth of a volt).

It is very easy, therefore, for muscle signals to interfere with nerve signals.

Tell your patient that the test works best when the muscles are relaxed, but avoid saying, “You need to relax.” No one knows if the idea of being told to relax (or being told to go to sleep) will work. I often say, “Imagine yourself a limp rag doll and let your body go.”

Incidentally, the time of day can also work in your favor when trying to encourage a patient to relax. Siesta time (usually around two or three o’clock) is the time of day when our biological machinery could either use a cup of tea or a nap. I find it very easy to encourage relaxation during this time of day.

In my experience, the visual evoked response (VER) is usually fairly easy to obtain due to the robustness of the response. The brainstem auditory evoked response (BAER) is much more difficult to obtain, even though it’s really boring and some people fall asleep. If there is a good deal of artifact in the BAER, then I can be assured that if this patient also is scheduled for a somatosensory evoked response (SSER), the SSER too will be difficult to obtain.

Consider the sources of artifact during evoked response testing. The recording electrodes are placed on the scalp (and neck for SSER testing). Scalp electrodes easily pick up eye blinks, so we ask the patient to close their eyes. These electrodes are also sensitive to EMG activity in the muscles of the neck (and by extension, the muscles of the head, namely the occipitalis and frontalis). Suggesting that the patient relax their neck often falls short of
Editor’s Note: The following section is compiled from information distributed by various sources including the Joint Commission on Accreditation of Healthcare Organizations (JCAHO); www.jointcommission.org.

What Does Future Hold for Hospitals?
National Conference Focuses on Far-Reaching Innovations to Transform Care Systems

Wired hospitals, green thinking and robotics—these are just a few of the innovations thrusting health care leaders into the future. Adjusting the way hospitals deliver patient care in light of sweeping changes in economic, demographic and workforce trends and technology will dramatically impact their ability to not only survive, but also thrive in competitive marketplaces.

The challenges associated with successfully managing such far-reaching changes will be the focus of a national symposium sponsored by The Joint Commission and Joint Commission Resources, an affiliate of The Joint Commission. The Hospital of the Future: Strategies for Driving Organizational Transformation will be held April 26-27, 2007, at Walt Disney World in Orlando, Florida.

Internationally renowned author and futurist Ian Morrison will provide an in-depth look at the current state of health care, what lies ahead and how to navigate the turbulence between the market and society.

Key topics addressed at this national gathering of health care leaders include:
- Environmental trends, such as the rising numbers of uninsured patients, advanced technology and value-based care, that will impact the hospital of the future;
- Economic and social factors that will influence hospitals;
- Workforce recruitment, training and retention strategies to assure access to adequate numbers of competent staff;
- Enhanced partnerships with patients and families to create a more patient-centered model of care;
- Factors that are influencing the design and operation of hospitals; and the
- Globalization of health care delivery.

The Hospital of the Future symposium is one of a series of Joint Commission conferences addressing major public policy issues in health care. As part of its public policy initiative, The Joint Commission recently focused on the nursing shortage, organ donation and medical malpractice, emergency preparedness and health literacy—critical areas that are adversely affecting the quality and safety of health care. The Joint Commission brings together health care experts to discuss issues of greatest concern, identify workable solutions, and assign specific accountabilities for action. The Joint Commission expects to issue a white paper on the hospital of the future later this year.

Cost of The Hospital of the Future conference is $895, with discounts available for multiple participants from the same organization. The cost is $695 for participants who register at least 30 days in advance. For a complete symposium agenda and more information, please go to www.jcrinc.com or call 877.223.6866.

ASHHRA Labor Activity Survey and Report

Outsourcing, union organizing, employment growth - these are just a few of the hot topics in healthcare today. In cooperation with the ASHHRA Legislative & Labor Committee, IRI Consultants to Management, Inc. produces the semi-annual Labor Activity Survey and Report. The report contains current data and tracks historical trends on a number of issues unique to healthcare. Copies of the report are available by contacting the American Society for Healthcare Human Resource Administration at www.ashhra.org.


achieving the desired results. It helps to use a cervical pillow.

This is where my experience as a massage therapist comes in. There is a technique in Cranio-Sacral Therapy® called “occipital release,” where gentle, constant pressure is applied by the fingertips on either side of the midline to the muscles of the neck between C2 and the occipital ridge of the skull. This is done with the patient on their back using the weight of the head to determine how much pressure is applied.

Try this modified technique on your colleagues or significant other: Have them lie on their back on the exam table (if in a recliner, make sure it is fully reclined – you want gravity to do the work for you). Sit behind your subject (at the head of the exam table) and place your hands palm up along either side of the occipital ridge. Ask them to let their head go in your hands – you might try rocking their head back and forth in your hands to get them used to the idea. Then with the two middle fingers of each hand (digits III & IV), apply light pressure underneath (caudal to) the base of the skull, feeling for the spinous process of C2. There is no need to bear down unless the muscles are really tight, preventing you from palpating C2 – just continue the pressure until the muscles get accustomed to it – they will gradually give way. Failing that, apply light traction to the neck by placing one hand over the occiput, the other over the forehead (hopefully your frontal electrode is at Fz and not Fpz). Gently pull the base of the skull toward you holding it in your hand with even pressure on the forehead, thereby “stretching” the neck. Either of these maneuvers serves to “reset the tone” of muscle – encouraging the muscles to “realize” their state of hypertonic contraction and helping to retrain the feedback loop that maintains muscle tone. In other words, it encourages the patient to relax.

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