A complication of neuromonitoring: electrosurgical burns

A 13 year old female presented for posterior spinal fusion for idiopathic scoliosis. Neuromonitoring needle electrodes to measure motor and somatosensory evoked potentials and electromyography were placed by the neurophysiologist after induction. Following an uneventful intraoperative course, the drapes were removed in preparation for emergence. After removal of the neuromonitoring electrodes, several small burns were present at the insertion sites on the bilateral lower extremities. The largest was 1 cm in diameter and all appeared to be full thickness burns. There were not any burns on the upper extremities. The skin underneath the grounding pad and the EKG electrodes was normal. Pictures were taken of the burns and all equipment was sent to the manufacturing company for evaluation. The parents were informed of the burns. At the patient's six-week follow up with the surgeon, the scars were still present so she was referred to plastic surgery for further evaluation. After treatment for six months, evidence of the burns was present as hyperpigmented lesions. The manufacturing company determined that the equipment was at fault.

Introduction:
Electrosurgical burns in the operating room are relatively uncommon. However, when they occur they can result in permanent injury to skin, nerves, or muscles. Neuromonitoring is frequently used to aid in the early detection of potentially devastating neurological injury during spinal surgery. The use of neuromonitoring electrodes introduces the potential for burns at the insertion sites. Anesthesiologists must be aware of the proper safety measures to assure the patient is not at risk for this adverse event.

Case Description:
A 13 year old female presented for posterior spinal fusion for idiopathic scoliosis. Neuromonitoring needle electrodes to measure motor and somatosensory evoked potentials and electromyography were placed by the neurophysiologist after induction. Following an uneventful intraoperative course, the drapes were removed in preparation for emergence. After removal of the neuromonitoring electrodes, several small burns were present at the insertion sites on the bilateral lower extremities. The largest was 1 cm in diameter and all appeared to be full thickness burns. There were not any burns on the upper extremities. The skin underneath the grounding pad and the EKG electrodes was normal. Pictures were taken of the burns and all equipment was sent to the manufacturing company for evaluation. The parents were informed of the burns. At the patient's six-week follow up with the surgeon, the scars were still present so she was referred to plastic surgery for further evaluation. After treatment for six months, evidence of the burns was present as hyperpigmented lesions. The manufacturing company determined that the equipment was at fault.

Discussion:
Burns from neuromonitoring electrodes occur either due to direct current from failure of equipment or due to excessive radiofrequency current density originating from a monopolar device (“bovie”). Measures to prevent electrosurgical burns include frequent equipment checks by certified personnel, inserting the needles as far from the surgical field as possible, placing the grounding pad as near to the surgical site as feasible and to assure the pad has adequate contact with skin. Also, paste-on electrodes with large surface areas are associated with a lower incidence of burns than needles.

If an electrosurgical burn occurs, a standard data collection process should ensue. All information related to the incident should be logged. The equipment should be left connected and sent for evaluation. Color photographs should be taken. The patient and the family should also be notified of the event immediately.

Conclusion:
Electrosurgical burns can lead to significant discomfort and morbidity for patients. It is important to maintain professionalism and give full disclosure to the patients and their families, so that they can seek appropriate medical care and follow up. It is also imperative to determine the cause of the burn in order to avoid future adverse events.

References: