Clinical anesthesia in spinal cord injuries
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Patients with quadriplegia and paraplegia present unique problems to the anesthetist—problems ranging in scope from severe muscle contractures to cardiac arrest caused by sudden potassium release. The author provides some insights into these cases, based on his own experience through the years. He includes a discussion of the neurogenic headache phenomenon found in quadriplegics above C-7.

Modern nursing literature is studded with articles that advocate total care of the patient. In general, this involves sound common sense and the old axiom “putting yourself in the patient’s place.” This situation does not apply to the short-term surgical patient, as anesthesia contact is limited to a brief pre- and postoperative visit.

The spinal cord patient is a long-term case involving most body systems. Anesthesia plays a major role in the well being of the cord injury patient. Repeated anesthesia is needed to accommodate the variety of surgical treatments commonly encountered. Some of the ailments that these patients are subject to include: kidney stone, atonic bladder, multiple contractures, skin and tissue ulcers, fractures.

McGuire Veterans Hospital is a large Spinal Cord Center located in Richmond, Virginia. It is affiliated with the Medical College of Virginia and houses all the medical specialties including a Kidney Transplant and Dialysis Center.

This article will focus on some clinical observations in anesthesia and how it affects the quadriplegic and, to a lesser degree, the paraplegic patient.

The common cause of spinal injury is trauma resulting from acute accidents. However, the classical cervical spine results from diving into shallow water. Here, the compressed spine may sever the cord below C-4, causing instant paralysis. The quadriplegia may be more gradual from edema of the cord. Early recognition with steroid therapy and decompression laminectomy can prevent or limit the quadriplegia. Direct missile and gunshot wounds are less selective, as the expanding energy force devastates vital brain structures.

Anesthesia hazards

From the anesthesia viewpoint, the newly acquired cord patient presents problems. When immediate laminectomy is elected, the induction of anesthesia has its hazards. Assuming the patient’s stomach is full, the awake intubation is further complicated by the splinted neck. The chances of severing the cord continues with “bucking” and positioning in the prone position.

In some cases of incomplete quadriplegia, surgeons will elect laminectomy many weeks after the injury. This brings us to a dangerous phenomenon, similar to the sudden potassium release found in post-massive burns. The mechanism
in the quadriplegic case is vague, but the administration of a depolarizing relaxant (succinylcholine) will cause severe hyperkalemia resulting in fibrillation and cardiac arrest. It could be assumed the denervated cells react in the same manner as the traumatized cell in burn cases.

Regardless, the hyperkalemia is a real and dangerous possibility. Statistically, this potassium release will occur between the 10th and 90th day, post the cord injury. From past experience, we no longer use depolarizing agents, unless the cord injury is over one year and the potassium level is normal.

We are all familiar with the depressing picture of the young adult suddenly devoid of mobility and natural functions. What follows is a depression reaction that will take one year to resolve. In the meanwhile, should the anesthetist get this patient for surgery, his or her tact will be tested.

Many young quadriplegics are extremely hostile. This writer has been sworn at and has had every move questioned. Once, I was confronted and accused of causing a pressure sore by a patient. The skin surfaces on the inner aspect of the knees were broken. While in the recovery room, the patient had muscle spasms and possibly the “pentothal shakes,” resulting in friction sores.

A surprising number of cord injury patients will decline general anesthesia when the surgical field has no feeling one way or another. From prior surgery, the patients have learned the hazards of reduced ciliary activity, namely, bronchitis and static pneumonitis.

The anesthetist will do well to listen to the patient and his body reactions to given situations. I recall my alarm when one patient began profuse sweating. He assured me that he did this when he was cold! Many times one finds paradoxical reactions to extremes of cold and heat.

**Neurogenic headache**

Quadriplegics with levels above C-7 manifest one unique problem called “neurogenic headache.” Following stimulation of the urinary bladder from distention and irrigation, the patient has a severe sympathetic response. The blood pressure and pulse begin a steady rise, followed by the patient appearing flushed and complaining of severe headache.

I found these patients to have a profound fear and apprehension of this headache. Even after general anesthesia, this headache persisted for 12 hours. Conventional general anesthesia did not prevent this headache. Indeed, it could be argued that this sudden elevation of endogenous adrenalin could precipitate cardiac sensitivity when inhalation agents are used. To antagonize the adrenalin release, this writer proposed the use of Thorazine®. However, clinical doses had little effect.

Dr. Vincent Pallares, chief of anesthesia here, suggested the use of pentolinium (Ansolysen®), a profound sympathetic blocker. This proved highly effective in 2-5 mg doses IV, at the first sign of a rise in blood pressure. Constant monitoring of blood pressure and titrated small doses of pentolinium will avoid blood pressure drops below preoperative levels.

Spinal cord patients have a very articulate communication between each other. It was soon common knowledge that we had a “new” cure for the dreaded headache. Any bad side reactions to anesthesia will be discussed from ward to ward. One agent was soundly denounced due to the “bad dreams” it produced. I have had patients tell me that they did not want that “nightmare stuff.”

**Anesthesia basics**

The narcotics are used frequently in anesthesia for spinal cord patients. Repeated anesthesia excludes halogenated agents. Muscle relaxants are used in minimal doses, as the muscle tone is poor in these patients. Many times, amnesia is all that is needed. The anesthetist will find a high tolerance to Valium® in
quadriplegics, as this drug is taken daily to control muscle spasms.

Most anesthetists will not be involved in anesthesia for spinal cord patients. However, should the need arise, a detailed history of prior anesthesia will be needed. These patients have a good knowledge of themselves and quickly will reveal any adverse reactions from the past.

It must also be remembered that these patients have severe contractures as a result of limited motion. The anesthetist should take time to examine the range of motion of the patient prior to anesthesia. This will avoid accidents when one is adjusting the arms or legs to specific positions. Gentle movement to and from the table will avoid skin abrasions and infection to devitalized tissue. It is good policy to explain each contemplated move, as quadriplegics do not adjust easily to surprise moves.

Finally, show some interest in the patient as a person. The visit to the operating room is a break in the routine life of the cord patient. We are obligated to make his memory of the visit a pleasant one. Failure to do so will cause brooding and may generate a new fear . . . to anesthesia.

AUTHOR
Colum Tobin, CRNA, received his nurses’ training at Victoria Hospital, Bournemouth, England. He then worked as an RN in his native Ireland, prior to coming to the United States and enrolling in the Misericordia Hospital School of Nurse Anesthesia in Philadelphia, Pennsylvania. He graduated from Misericordia in 1958. For the next two years, he served as staff anesthetist at the Northeastern Hospital in Philadelphia. From 1960-64, he served as the sole anesthetist at the Crisfield Community Hospital, Crisfield, Maryland. He then served six years in the U.S. Army as an anesthetist, attaining the rank of major. Since 1970, he has been with the McGuire Veterans Administration Hospital in Richmond, Virginia, and is presently chief anesthetist.