

## CdLS and Anesthesia

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One of the guiding principles of pediatric anesthesia is to utilize an individualized approach for each patient. As has been emphasized previously, the anesthetic approach to children and young adults with CdLS is and must be very individualized.

The most important elements for a positive experience are meaningful communication with the anesthesiologist before the procedure and parental presence during induction and emergence from anesthesia. Parents should be clear as to their child's previous experience with anesthetic drugs and actively participate in choosing what approach would be best for their child. Parents should find out from their anesthesia providers what the options are available for their child.

Parents know their children and will often guide the anesthesiologist into choosing the best option. As an example, some children who have asthma have experience with breathing treatments and are usually more comfortable than others are with a mask induction of anesthesia.

Some may not be fearful of needles, and others will only do well with a rapid shot of sedating medicine. The challenge is to successfully obtain IV access in the least traumatic fashion possible. Parental presence is often much more effective at relieving a child's anxiety during these difficult periods with medications. Depending on the institution, parents can bring their child's comfort items with them for both induction and the recovery period.

As children awaken in an unfamiliar environment, they may become agitated and upset. The remaining effects of the anesthetic may worsen the child's discomfort by clouding their perceptions and sensations. The presence of a parent and the child's favorite blanket, music tape, or video can be very effective at easing children through these periods. Parents should find out ahead of time what to bring on the day of the procedure. Unfortunately, much of what we know about the interaction of anesthesia with individuals who have CdLS is based on anecdotal experience. In pediatric anesthesia textbooks, the anesthetic consideration for those with CdLS is limited to concerns about their airways and difficulty with IV access. Children with CdLS often have short jaws and necks, which increase



the difficulty of maintaining an open airway and placement of a breathing tube. Not infrequently, a bronchoscope (an airway telescope) is required to safely place the breathing tube. Many patients with CdLS have shortened upper extremities and limitation of movement at the elbows, which limit the areas available for IV placement when they are awake. Often, following sedation, these contractures may be modestly relaxed and IV placement is easier. One textbook has stated that “patients with Cornelia de Lange Syndrome may have decreased anesthetic requirements.” This certainly has not been our experience. Although individualized, children with CdLS seem to require more anesthetic per body weight than average in order to maintain an adequate plane of anesthesia.

Several medications often used in pediatric anesthesia are the Benzodiazepines: Midazolam (Versed) and Diazepam (Valium). Benzodiazepines are commonly used as a preoperative sedation in an effort to minimize anxiety and ease IV insertion. Depending on a child’s age, these drugs can be given orally, nasally, as a suppository, or as an injection. These drugs work by binding to certain specific areas, called GABA receptors, which decrease the general activity of the brain, usually producing a state of calmness, sedation and amnesia.

Unfortunately, some people respond to Benzodiazepines in a paradoxical manner, becoming disinhibited (free of inhibitions), agitated, emotional, excited, or violent. It is estimated that one percent of healthy adults and up to five percent of healthy children will develop these paradoxical reactions to Midazolam. The exact cause of this reaction is unknown. There may be subgroups of patients who have abnormal GABA receptors that may predispose them to this abnormal response. To date, there is no data to determine whether the GABA receptor in CdLS is similarly affected.

Some recent information has been obtained, however, from a Foundation-supported study carried out by two dentists, Douglas Clemens, D.M.D, a CdLS Foundation Clinical Advisory Board member in private practice, and Ellen Alpano, D.D.S., from the University of Maryland Dental School.

Dr. Alpano collected records and hospital charts on patients with CdLS who had undergone anesthesia for dental procedures. Based on hospital records, of those individuals with CdLS who received a pre-medication for anesthesia, 80 percent (four of five patients) who received Midazolam had an adverse post-operative event, compared to 28 percent (two of seven patients) who received a different medication as a pre-medication.

Thus, an alternative medication to Midazolam for anesthesia should be considered in patients with CdLS, but further studies need to be carried out



since these numbers were very small [Kline AD, et al. Cornelia de Lange syndrome 4th biennial scientific and educational symposia abstracts. Am J Med Genet Part A 152A:2683-94, 2010].

The common risks of an anesthetic can involve complications of breathing, heart function, recall, and allergic reactions to the medications. These risks are usually far less than the risks of the car ride to the hospital. The major areas of increased risk for the patient with CdLS are airway and injury when emerging from anesthesia. As mentioned, some children with CdLS have an abnormal structure of their airway which increases their chance of developing some form of airway obstruction either during or after the procedure, as well producing an increased difficulty when placing the breathing tube.

Some children with CdLS awaken from their anesthetic in an aggressive state, which puts them at risk for injury from contact with bed rails and other medical equipment. Since history is usually very predictive, alerting the care team if this has happened previously will allow them to minimize the chances of injury by the use of pads on the hard surfaces of the bed.

All of this information should be reviewed with the anesthesiologist prior to any procedure performed under anesthesia. We are always happy to speak directly with the professionals, if indicated, as well.

