# PROTOCOL FOR ANESTHETIC MANAGEMENT OF BIV-ICDS

## ANESTHETIC TYPES:

Sedation-analgesia: Intravenous (IV) delivery of agents including but not limited to midazolam, etomidate, propofol, diphenhydramine, remifentanil, dexmedetomidine, and fentanyl to produce a semi-conscious state varying from light to deep sedation. The patient is arousable and may move. The deeper the sedation the greater the possibility of respiratory depression and the higher the  $CO_2$  will climb. The resultant respiratory acidosis is reversible upon lightening the anesthetic.

*General anesthesia:* Production of complete unconsciousness using inhalational and/or IV anesthetic agents. The airway requires protection.

*Laryngeal Mask Airway (LMA)*: Usually performed using a single dose of an IV anesthetic agent (etomidate preferred when LVEF < 40%) followed by an inhalational agent for maintenance of anesthesia. No muscle relaxant is needed. Patients typically breathe spontaneously, but are at risk for hypercarbia and respiratory acidosis, which is usually reversible upon lightening the anesthetic. Relative contraindications for LMA use are obesity, diabetes, and abnormal pharyngeal anatomy. LMAs can become dislodged, which presents a problem when the anesthesia provider has limited access to the patient's head.

*Endotracheal intubation*: Usually performed with an IV anesthetic agent in combination with a muscle relaxant. Maintenance of anesthesia can be provided by either inhalational or IV agents. Hypercarbia and respiratory acidosis is typically not an issue as respiration is completely controlled.

## BIV-ICD PROCEDURE:

The placement of leads into the right atrium, right ventricle, and epicardial left ventricle via the coronary sinus as well as the development of a subcutaneous pocket for the generator. This is usually followed by defibrillation testing, which entails the induction of ventricular fibrillation and an ensuing shock by the device. The procedure lasts on average 1-2 hours longer than a traditional dual-chamber ICD and the total length of the procedure ranges from 3-4 hours. The majority of patients receiving BIV-ICDs have a significantly compromised LVEF.

## ANESTHETIC APPROACH TO BIV-ICDs:

1) An anesthetic approach for a particular patient should be tailored to the needs of that patient. Most patients receive adequate pain control and comfort with sedation-analgesia and the liberal use of local anesthetics. However, a myriad of special considerations point towards safer care with the use of a general anesthetic. Therefore, a discussion needs to occur between the attending anesthesiologist and electrophysiologist after the patient has been evaluated but prior to the patient entering the electrophysiology laboratory. After an in-depth discussion during which consensus is attempted, the ultimate decision as to

anesthetic choice remains in the hands of the anesthesiologist providing the anesthetic care. The safety of the patient remains the primary concern and the ultimate determinate of the anesthetic approach.

- 2) Considerations pointing toward the need for a general anesthetic:
  - a. Patient factors:
    - i. Patient request for general anesthesia
    - ii. Patient anxiety
    - iii. Lack of patient mental competency
    - iv. Inability to hold still (i.e. severe back pain)
    - v. Obstructive sleep apnea that inhibits amount of sedation that can be given
    - vi. Compromised respiratory function (i.e. severe COPD)
    - vii. Morbid obesity
    - viii. Uncontrolled GERD
    - ix. Other aspiration risks, etc.
  - b. Electrocardiologic considerations
    - i. Anticipation of longer than normal procedure times
    - ii. Need to extract a lead as part of the procedure
    - iii. Anticipated difficulty accessing vascular beds
    - iv. Complex anatomy, etc.

### RADIATION EXPOSURE CONCERN:

Concerns have been raised that conscious sedation may lead to a higher than allowable radiation dose to the anesthesia providers, since they frequently remain at the head of the table supporting the patient's airway while fluoroscopy is being used. Evaluation of all EP personnel files, including the anesthesia team, indicates that documented exposures are well below local and national safety limits, resulting no alerts over the past three years. However, in the interest of provider safety where zero exposure is desirable, additional shielding for the head of the table should be acquired and used when conscious sedation is the anesthetic choice.

### **INVASIVE MONITORING:**

At the same time that a discussion between the anesthesiologist and electrophysiologist occurs concerning the type of anesthesia planned, a discussion of any special circumstances that would require invasive monitoring should also be discussed. Except for exceptional circumstances, invasive monitoring is not expected to be utilized.

### FOLEY PLACEMENT:

The decision to place an indwelling foley catheter should be discussed. Patients may benefit in the setting of BPH, incontinence, and anticipation of a prolonged case. All efforts should be made to remove the foley at the end of the case. (7-14-2014 Moore/Schaller)