ISUPREL CHALLENGE – ONE APPRAOCH

The isuprel challenge is typically used to induce the arrhythmia being studied, either at the beginning of a procedure to evaluate where the arrhythmia is coming from, or at the end of a procedure to test whether the arrhythmia has been properly ablated. The challenge can be given to patients under general anesthesia where the effects can be dramatic or under sedation where the effects are much reduced.

ISUPREL CHALLENGE UNDER GENERAL ANESTHESIA – Used usually during atrial fibrillation ablations on jet ventilation with an arterial catheter in place.

1) Never attempt an isuprel challenge under general anesthesia without invasive blood pressure monitoring.

2) Isuprel can lighten the level of general anesthesia so deepen the anesthetic level during the challenge if not already deep. Remifentenil should be at least 0.15 mcg/kg/min and propofol at 80 mcg/kg/min as a general rule but base depth on what the patient has needed prior to the challenge. There is wide patient variability but you do not want the patient to be suddenly moving during the challenge which will disrupt the cardiologist's map of the heart.

3) Once it is announced that an isuprel challenge is to begin, turn up the IV infusion rate so neosynephrine (NEO) is reaching patient rapidly immediately whenever changes NEO infusion rate are made. (Remember to turn IV back down at the end of the challenge since a significant limitation in fluids is required because so much fluid is given by the ablation catheters.) At this point push the blood pressure up to 130-140 torr systolic using NEO. Once again there is wide patient variability on how much NEO will be needed to do this but typically 100 mcg/min is sufficient. There is about three minutes from the time isuprel is started before it actually starts producing physiological effects, so one has time to adjust the NEO level. If systolic BP goes over 140 or is 130 and rising at a brisk rate during this time, pause the NEO and let the systolic BP level to start falling toward the 135 torr level before restarting. The key to the isuprel challenge is ANTICIPATION of where the BP is going and the time it takes for the NEO to work when the infusion rate is changed.

4) Isuprel is typically started a 3 mcg/min. The BP should be 130-140 torr as one waits for the isuprel to take effect. The first indication the isuprel is working is a subtle increase in heart rate. One may see an increase from 50 bpm to 53 bpm. (The a-fib patients typically have bradycardia.) Along with the slight increase in heart rate one will often see a dramatic 40 torr fall in the systolic BP. The BP drop is the reason one wants to start with a systolic BP of 140, rather than 100 torr. Based on the initial fall in the systolic BP, adjustment in the NEO will be needed. This is adjustment is often from 100 mcg/min to 150-200 mcg/min, but remember

there is great variability between patients and judgement must be based on what the patient has needed previously and what the patient's response has been to changes in the NEO. If BP falls too low some use bolus doses of NEO but others avoid this approach due to the potential for wide swings in BP.

5) The Isuprel infusion rate will be changed on the request of the cardiologist to 6, 12, 20, 30 and sometimes 40 mcg/min. Each change requires active attention by the anesthesiologist with close observation of small changes in the systolic pressure which will indication a change in the NEO infusion rate will be needed. The NEO drip rate will need to be CONSTANTLY changed, so even a short lapse in attention can lead to poor BP control. Increases in the NEO infusion rates by 50 – 100 mcg/min will be needed as the isuprel is increased. Typically maximum doses of NEO by the end of the challenge are 350-500 mcg/min.

6) When the isuprel is between 3-12 mcg/min the systolic should be kept in the 130-140 torr range. At the 20-40 mcg/min infusion rate of isuprel the target systolic BP should be 110-120 torr. The reason for the lower target BP is the isuprel may be suddenly turned off at any time and since NEO is metabolized more slowly than isuprel, there will always be a rebound hypertensive response. It is better to have the lower BP as a baseline when the isurel is stopped.

7) As soon as the cardiologist says to stop isuprel, the NEO needs to be stopped. There may well be rebound hypertension but one needs to just wait this out.

8) Once the BP begins coming down to the pre-challenge BP level, whatever baseline level of NEO that the patient was on can be restarted. Remember to turn down IV infusion rate at this point.

ISUPREL CHALLENGE UNDER CONSCIOUS SEDATION

The times where isuprel is used during conscious sedation is typically for patients having PVC and VT ablations. The level of infusion of isuprel in these patients is typically much lower in the 3-12 mcg/min level, and the physiological response of hypotension is much less than under general anesthesia. Since these patients frequently have very low ejection fractions, turning up the NEO to force the systolic BP up must be done very carefully and in moderation. Usually, the anticipation of BP that is used under general anesthesia is not needed and simply reacting to changing BPs is acceptable most of the time. The cardiologist is well aware of how sick these patients are will give you time to react to changes in BP but the anesthesia approach should be using moderation and gentleness in making changes. Epinephrine infusions should also be considered with patients have very compromised ejection fractions who need their BP supported during the challenge.