ECMO with a Magnetically Levitated Pump During Ablation with Remote Magnetic Navigation System

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Objective

• Case presentation
• Describe the use of magnetically controlled ablation and Centrimag pump/ecmo system
• Discuss alternative options

Case Report

• 38yo woman with PMH significant for TGA s/p Mustard procedure (1978) c/b SVT/HB as a child s/p PPM x3 (currently not with PPM) admitted initially to OSH w/cardiac shock 2/2 biventricular heart failure.
• Transferred to NYPH for ECMO on 12/15 which was continued through 12/23.
• Biventricular failure thought to be 2/2 multiple tachy-arrhythmias; patient underwent EP ablations of 3 of 5 identified foci of ectopy.
• Transferred from CT ICU to CCU on 12/24 on milrinone and dobutamine drips; has been weaned off now. On coumadin for LLE DVT.
• Ultimate plan is to discharge to Pennsylvania to live with father.
Overview

- The described patient presented to us with the potential complication of using a powerful remote magnetic navigation system (MNS), Niobe by Stereotaxis for cardiac ablation on an ECMO patient.
- Difficulty with a magnetically levitated pump (MLP) Centrimag by St. Jude-Thoratec. Since both systems utilized magnets, we hypothesized that the effect would be even greater than it had been on other ferrous containing devices in the procedural room (IV pumps).
- Contact with the manufacturers of both devices in question revealed no information on concomitant use of the systems.

Methods

- Prior to patient arrival into the procedural area, we tested a mock MLP circuit with the MNS.
- The MLP was placed with 12 inches, 13-24 inches and 48 inches away from the closest point of the MNS magnets.
- Concern was based on previous experience using other devices such as intravenous pumps, monitors ferrous metal constructed equipment.

Stereotaxis overview

- The system utilizes two permanent magnets mounted on pivoting arms that are enclosed within a stationary housing, with one magnet on either side of the patient table.
- Magnetic control of the working tip of the interventional device.
- This provides the ability to safely access anatomic areas unreachable by other approaches.
Stereotaxis Niobe Ablation System

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Results

- The MLP stopped completely when it was within 12 inches of the MNS magnet.
- At 13-24 inches, the flow readings varied and the MLP was vibrating as if it would de-couple.
- There were no alterations when the MLP device was 36-48 inches away from magnets of the MNS.

RPMs versus Distance from Magnet  
Baseline = 3000 RPM
Conclusions

• Cardiac ablation with magnetic navigation is necessary for some patients.
• Faster procedural time
• Fewer perforations
• Less radiation exposure
• Caution is required when used concomitantly with a MLP system such as a Centrimag.
• MLP devices can be safely used when a distance of 48 inches or more separates the systems.