

Overcoming barriers in OR time by moving to the EP lab

Protocol guidelines, a UPenn success story

Background

In 2016, the lead extraction program at the Hospital of the University of Pennsylvania (UPenn) transitioned from the operating room (OR) to the electrophysiology (EP) lab. This change was driven by frequent delays and cancellations in the OR due to urgent surgical procedures. At the time, approximately 50 lead extraction cases were performed annually in the OR. Since the transition, the volume has grown to more than 100 cases per year in the EP lab. By utilizing dedicated EP equipment and teams and ensuring access to rescue surgical protocols as in the OR, the move to the EP lab has facilitated more streamlined scheduling, enabling the treatment of more patients without compromising safety.

Pre-operative protocol

- 1 General anesthesia for every case with the chest completely prepped.
- 2 Radial A-line exclusively for every case.
- 3 Minimum placement of 3 venous sheaths: 1 for the Bridge occlusion balloon, 1 for intracardiac echocardiography (ICE), and 1 for snaring (performed in about 10% of UPenn cases) or temporary pacing.
- 4 ICE is placed from the left groin so it remains maneuverable from the left side of the patient and covered by a sterile sheet in a non-infected cases.
- 5 Bridge Balloon - Bridge wire up in every case through the 12F sheath and staged prophylactically in high-risk cases.
- 6 Surgical colleague is informed via email the night prior with patient characteristics and case timing to ensure coverage.
- 7 A surgical cart is housed in the EP lab with all tools needed with the intention of repairing an injury in the EP lab. This includes a sternal saw, sutures, etc.

Intra-operative protocol

- 8 Prior to lasing, the surgical team is contacted by phone to confirm immediate availability. In rare instances, the surgeon may request a delay of 10-20 minutes, which is accommodated as necessary.
- 9 An extraction "time-out" is conducted prior to lasing to emphasize the critical nature of this stage. During this time-out, the team ensures that all members are aware of their specific roles in the event of an emergency. Silence is maintained, and anesthesia is instructed not to make any changes without prior discussion.
- 10 Bypass or ECMO machines would be requested by CTS at the time of rescue.

Ongoing progress

- The UPenn protocol benefits from ongoing education and analysis to ensure that rates of surgical interventions remain acceptably low.
- Regular communication with staff, typically 1-2 times per year, has been instrumental in explaining the rationale for the protocol. Additionally, a small group of core extraction lab staff was formed to ensure ongoing involvement and knowledge of the program and procedure.
- Over the past eight years, the EP lab has performed over 700 transvenous lead extraction (TLE) cases, achieving a safety profile that exceeds the national average.
- Key strategies to minimize complications include preoperative and intraoperative ICE imaging, the use of telescoping inner and outer sheath systems, particularly while working within the superior vena cava, and frequent alternating of leads to carefully dissect.



"Transvenous lead extraction has evolved into a well-established and predictable procedure, playing a key role in modern electrophysiology programs."

-Dr. Robert Schaller



About Dr. Robert Schaller

Dr. Robert D Schaller is Associate Professor of Medicine at the Hospital of the University of Pennsylvania where he serves as the director of device therapy and extraction and the co-director of the clinical research program. His focus is on the care of patients with heart rhythm disorders and specializes in ablation of complex atrial and ventricular arrhythmias as well as lead and device management, with a focus on lead extraction.

