Case Report

Novel Use of the Midas Rex Neurosurgical Drill to Release Silicone Glue Entrapped Pacing Leads

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Case Report

We present the case of a 69 year old female with severe left ventricular (LV) dysfunction (LVEF 27% on echocardiography) and NYHA III-IV symptoms secondary to myocarditis. Persistent atrial fibrillation (AF) was treated with catheter ablation in 2006 and subsequent AF recurrence was managed with AV node ablation in 2008. Prior to this, biventricular pacemaker (CRT-P) insertion was planned, but LV lead delivery failed due to lack of target veins. A decision was made for bifocal right ventricular pacing (two RV leads: RV apex and RVOT) as this approach has been proven to produce benefit when LV lead placement fails [1]. Subsequently, after an unexplained syncopal event, the CRT-P device was upgraded to a biventricular ICD (CRT-D device) later in 2008. Her heart failure symptoms remained severe despite AV node ablation and bifocal RV pacing. In the context of ongoing heart failure symptoms, further echocardiographic assessment demonstrated severe dyssynchrony in 2009. Therefore, insertion of an epicardial LV lead was planned. During epicardial LV lead placement, the LV lead was fixed to the lateral LV wall via thoracotomy. The lead was then tunneled up to the old generator. Using a Y-connector and silicone glue, the new LV lead was spliced together with the RVOT lead and both were connected to the LV port (Figure 1A). Since the screw thread of the Y-connector was not protected by a plastic cover, it was recommended by the manufacturer to use silicone glue to avoid fluid seeping through after implantation.

The remaining RV apical lead was plugged into the RV port. Thus, we were able to utilize all of the pacing leads that had previously been inserted allowing us multi-site pacing of RV apex (from the RV port) as well as LV and RVOT from the two leads spliced together and plugged into the LV port. During the post-operative period the RV apical shocking lead was displaced, and the patient listed for a revision of her RV apical lead. Surprisingly, at the revision procedure it came out that her RV apical shocking lead had been spliced together with her LV lead rather than her RVOT lead as it was originally planned. In summary, we are faced with a displaced RV shocking lead that required repositioning. Since it had been plugged and silicone glued into a Y-connector alongside the epicardial LV lead, this could not be performed as usual. Several strategies were considered with respect to repositioning the RV shocking lead.
Since our main motivation was to preserve the function and position of the epicardial LV lead, we could not simply bury the RV lead as it was glued into the Y-connector and would also require sacrificing the LV epicardial lead. We concluded that the best option would be to release the LV lead from the Y-connector and then extract the displaced RV lead followed by implantation of a new RV shocking lead. Unfortunately, we were unable to release the set screw holding the LV lead in place due to the silicone glue. A literature search did not reveal any previously used methods that have successfully released a lead in this situation. We chose to attempt to release the LV lead by drilling out the set screw holding the LV lead into the Y-connector (Figure 2A and B).

**Figure 1:** A: Example of Y-connector used to splice two pacing leads together for use in a single pacing port. B: Midas Rex® drill. C and D: Examples of drill heads used to remove pacing set screw, C: Tapered head, D: Match head.

**Figure 2:** A: Set screw in Y-connector before drilling, and B: after removal with Midas Rex® drill. C: LV lead after removal showing small defect in pinhead, but no detrimental effects on pacing parameters were seen. D: Fluoroscopy image during coronary angiography demonstrating injection of left coronary system, but also position of pacing leads for multi-site pacing with two leads in RV in RV apex and RVOT and epicardial leads on the posterolateral LV.
This was accomplished within ten minutes and importantly without complication using the Midas Rex® drill (Medtronic) (Figure 1B). The only issues that we needed to address during the drill's use were management of debris and heat dissipation. We used continuous saline irrigation over the drilling site with the addition of two extra drapes to control the flow of the irrigated fluid away from the wound. This dissipated heat from the drilling site and prevented aerosoling of debris. Once the LV lead was released, it was wiped with damp gauze to ensure complete removal of debris. On inspection of the LV lead, a small abrasion in the pin was seen (Figure 2C), but all measured pacing parameters through the PSA were optimal. Once the LV lead had been released, the RV shocking lead was extracted intact without complication using simple traction with a stiff stylet. A new RV shocking lead was implanted in the RV apex and plugged into the generator in the usual position. The RVOT and LV leads were spliced together using a new Y-connector and were plugged into the LV port. Thus, we were able to extract and re-implant a new RV shocking lead and salvage the use of the epicardial LV lead. Splicing it to the old RVOT lead allowed us to provide multi-site pacing from the RV septum, LV and RV apex (Figure 2D), which we felt gave us the optimum use of the pre-existing implanted leads and the best chance of effective resynchronization of myocardial contraction.

The Midas Rex® drill is pneumatically powered and usually used in neurosurgical procedures or in spinal surgery [2]. An extensive choice of interchangeable cutting heads is available for the drill that is specifically designed to accomplish different tasks. We used a combination of the match head and the tapered tool (Figure 1C and D). In case we were to attempt a similar procedure again we would also like to have the metal cutter or twist drill heads available.

To the best of our knowledge, this is the first description of the use of the Midas Rex® surgical drill to assist in releasing a pacing lead from entrapment with silicone glue in a Y-connector. Ramicone and colleagues described a similar conflicting situation where they used an orthopedic drill to remove the pacing lead from the connector block during generator replacements [3]. However, they drilled directly into the plastic connector block as opposed to the screw in a Y-connector with our patient. Furthermore, our patient had severe heart failure and a biventricular ICD. Although the need for such a technique is unlikely to arise frequently, it proved to be a highly effective solution in this case and saved our patient from undergoing further pacing procedures and possible repeat thoracotomy.

References

