Supplemental Table 1. Detailed description of the failed transvenous LV lead and indications for concomitant surgery

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| Patient No. | Detailed description of failed transvenous LV lead | Indications for concomitant surgery |
| 1 | CRT non-responder | VT required epicardial ablation |
| 2 | Failure in Endo lead implantation due to dissection of CS |  |
| 3 | - III° atrio-ventricular block  - Advanced heart failure | VT required epicardial ablation |
| 4 | Failure in Endo lead implantation: CS stenosis |  |
| 5 | - Failure in Endo lead implantation  - Phrenic nerve capture/high capture threshold of LV |  |
| 6 | Failure in cannulation of coronary sinus due to CS stenosis |  |
| 7 | Failure in cannulation of coronary sinus due to CS stenosis |  |
| 8 |  | - Interventricular membranous aneurysm required surgical resection and repair  - LAA thrombin required LAA resection  - Atrial fibrillation required epicardial ablation |
| 9 | - Failure in fixation of LV lead in coronary sinus  - Tried HBP/LBBP, but failed to achieve satisfactory pacing spot |  |
| 10 | - Failure in cannulation of coronary sinus and angiography showed that the ostium of CS was upward  - Failed in HBP and LBBP due extremely large right atrium |  |

Abbreviations: CS, coronary sinus; HBP, his branch pacing; LAA, left atrium appendage; LBBP, left bundle branch pacing; LV, left ventricular; VT, ventricular tachycardia;