We read with interest the case report “Malpositioned Pacemaker Lead Presenting as a Peculiar 12-Lead ECG” by Amit et al in the last volume of the Journal. Right ventricular pacing with right bundle branch block (RBBB) morphology in precordial leads V1–V2 remains a surrogate marker for inadvertent left ventricular (LV) pacing since the early days of permanent pacemakers. Amit et al indicated in their discussion that the latter could happen in biventricular pacing or in cases of LV perforation. In addition, the right ventricular (RV) lead could inadvertently be implanted in the left ventricle through a patent foramen ovale, atrial or ventricular septal defect, or unintentionally in the coronary sinus, like their example. Therefore, obtaining a fluoroscopic view in the left anterior oblique projection is deemed invaluable to discern the appropriate RV lead placement. Nevertheless, uncommon exceptions to this phenomenon could exist when a true apical RV pacing could still give rise to a paradoxical RBBB morphology. Friedberg proposed that RBBB morphology with a maximal QRS vector orientation to the left may still indicate safe RV pacing; however, a red flag should be raised whenever a right inferior orientation of the axis is seen. Coman and Trohman have elaborated more on the degree of frontal axis plane deviation. They reported 86% sensitivity and 99% specificity for uncomplicated RV apical pacing if the frontal axis plane is between 0° and −90° and precordial transition is at V3. On the other hand, a transition at V4 might indicate a middle cardiac vein pacing with 72% sensitivity and 100% specificity. When a frontal plane axis occurs between −90° and −180° the possibility of LV pacing is likely. Amit et al present a 12-lead electrocardiogram (ECG) that demonstrates late V5 transition and a frontal plane axis between −90° and −180° in the presence of RBBB morphology. The axis deviation in this case, however, met the discussed criteria above for unintentional LV pacing. Figure 1a,b shows examples of RBBB morphology in leads V1–V2 during true apical RV pacing with leftward frontal axis plane between −45 and −90°. Both cases demonstrated matching axis deviation consistent with safe apical RV pacing. However, in Figure 1c we present another example of RBBB morphology with a frontal axis plane between −90° and −180°. Although the frontal axis plane indicates possible LV pacing in comparison to the presented example by Amit et al, imaging work-up proved the opposite. In this instance, the above-discussed criteria were not of considerable help to make a good discretion. In this case, leads placement up or below the parallel plane of the wavefront vector would enable to mask or unmask left bundle branch block (LBBB) morphology during true apical RV pacing. Klein et al suggested this maneuver by displacing V1–V2 precordial chest leads down to the fifth or sixth intercostal space (ICS) to unmask LBBB morphology. While Figure 1c shows a case of rightward axis consistent with LV pacing, full inscription into LBBB morphology during fifth and sixth ICS recording of leads V1–V2 suggested true apical RV pacing instead. A confirmatory test for apical RV lead implantation has been obtained by a chest X-ray. As demonstrated in all three figures, LBBB morphology in leads V1–V2 was evident when were displaced down to fifth and sixth ICS. This maneuver outcome supports the idea that cardiac disorientation has a direct influence on the electrical inscription of the paced QRS.

The authors report no conflicts of interest for the published content. Manuscript received July 3, 2013, final version accepted July 12, 2013.

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In summary, RBBB morphology during true apical RV pacing is not uncommon, and it can be seen in clinical practice. Surface ECG precordial mapping is a feasible and simple first step approach to unmask typical LBBB morphology that indicates true apical RV pacing.

References