Introduction: New developing high-density (HD) grid mapping catheter allowed HD wave bipolar recordings along and across the splines to identify isthmus. The role of mapping directionality in isthmus detection is not well investigated. We aimed to analyze whether different splines types creating local activation time (LAT) maps affected isthmus identification or not in atrial flutter (AFL) patients.

Methods: Baseline right atrium (RA) or left atrium (LA) maps were created by HD grid catheter (Abbott, CA) regarding the rhythm. Isthmus location and/or size were dragged by the following methods: combined splines, along splines and across splines.

Result: This pilot study included 3 AFL cases. Total and selected points were 26487 and 3704, respectively in case 1 (Panel A). Isthmus located over anterior-superior LA appendage (LAA) base was created by combined splines (Panel B). By along splines method, isthmus was downward and downsize to 0.1 cm² in area and 6 mm in length (Panel C). When across splines LAT was applied, upper part of the aforementioned isthmus re-appeared. The isthmus distance between different ways collection was 6 mm (Panel D). In case 2, as compared to combined splines based LAT (Panel E), the reentry arrhythmia circuit center moved toward RA anterior wall and lost its obvious circuit center in along splines based LAT (Panel F). In case 3, the functional block line distance of cavotricuspid isthmus differed in across splines based LAT (10 mm) and along splines based LAT (14 mm).

Conclusion: Our study proves shifting and downsize of isthmus when changing the vector of bipolar electrodes in HD grid. The critical isthmus could be identified by omnipolar mapping.