WHAT IS CLAIMED IS:

1. A medical implant delivery system comprising:

a puncture needle comprising an elongate portion and a puncture component associated with a distal end of the elongate portion, the puncture component being configured to pierce and form an opening in a target tissue wall;

a medical implant delivery catheter comprising a puncture needle lumen, the puncture needle being configured to be advanced through the puncture needle lumen, the puncture component being configured to be extended through a puncture needle outlet opening associated with a distal portion of the medical implant delivery catheter;

a medical implant device positioned on the medical implant delivery catheter; and

an outer delivery catheter comprising a medical implant delivery lumen, the medical implant delivery catheter being configured to be advanced through the medical implant delivery lumen, the distal portion of the medical implant delivery catheter being configured to be received within the medical implant delivery lumen and extended through a side outlet opening associated with a distal portion of the outer delivery catheter.

2. The system of claim 1, further comprising:

a puncture needle sheath configured to be passed through the puncture needle lumen, wherein the puncture needle is configured to be passed through a lumen of the puncture needle sheath; and

a radially expandable member associated with a distal portion of the puncture needle sheath, wherein the radially expandable member is configured to be positioned within the opening formed in the target tissue wall and to enlarge the opening when the radially expandable member is in an expanded configuration.

3. The system of claim 2, further comprising a medical implant delivery guide wire, wherein the medical implant delivery guide wire is configured to be slidably advanced through the lumen of the puncture needle sheath and to be exchangeable with the puncture needle.

4. The system of claim 1, wherein a distal portion of the medical implant delivery catheter is configured to be inserted into the opening formed in the target tissue wall, the distal portion comprising a predetermined diameter configured to enlarge the opening.

5. The system of any of claims 1 to 4, further comprising an outer delivery catheter guide wire, and wherein the outer delivery catheter comprises a guide wire lumen configured to receive the outer delivery catheter guide wire.

6. The system of claim 5, wherein the outer delivery catheter guide wire lumen extends along an off-center longitudinal axis of the outer delivery catheter.

7. The system of any of claims 1 to 6, wherein a distal portion of the medical implant delivery catheter comprises a lateral cross section having a shape configured to interlock with a shape of the side outlet opening on the distal portion of the outer delivery catheter to orient the medical implant delivery catheter as the medical implant delivery catheter extends through the side outlet opening, wherein the lateral cross section extends along a lateral dimension of the distal portion of the outer delivery catheter.

8. The system of any of claims 1 to 7, wherein the medical implant delivery catheter comprises a first tapered distal portion comprising a first pre-formed curvature and the outer delivery catheter comprises a second tapered distal portion comprising a second pre-formed curvature, wherein the first pre-formed curvature and the second pre-formed curvature comprise the same orientation.

9. The system of claim 8, wherein the first pre-formed curvature comprises a radius of curvature smaller than that of the second pre-formed curvature.

10. The system of claim 8, wherein the second pre-formed curvature comprises a shape configured to conform to at least a portion of a curvature along a length of a coronary sinus.

11. The system of claim 8, wherein the side outlet opening is on an inner edge of the second pre-formed curvature of the outer delivery catheter.

12. The system of claim 8, wherein the puncture needle comprises a third pre-formed curvature on a distal portion of the puncture needle.

13. The system of claim 12, wherein the third pre-formed curvature comprises a radius of curvature smaller than that of the first pre-formed curvature of the medical implant delivery catheter.

14. The system of any of claims 1 to 13, further comprising an expandable anchor, wherein the expandable anchor and the side outlet opening are on opposing portions of the outer delivery catheter, and wherein the expandable anchor is configured to assume an expanded configuration to position the outer delivery catheter against the target tissue wall.

15. The system of claim 14, wherein the outer delivery catheter comprises a second tapered distal portion comprising a second pre-formed curvature and wherein the expandable anchor is on an outer edge of the second pre-formed curvature.

~~16. A method for delivering a medical implant device, the method comprising:~~

~~advancing a guide wire into a vessel;~~

~~advancing a medical implant delivery system along the guide wire into the vessel, wherein the medical implant delivery system comprises:~~

~~an outer delivery catheter comprising a medical implant delivery lumen,~~

~~a medical implant delivery catheter comprising a medical implant device positioned thereon and a puncture needle lumen extending therethrough, the medical implant delivery catheter slidably extending through the medical implant delivery lumen, and~~

~~a puncture needle slidably extending through the puncture needle lumen, and a puncture component of the puncture needle extending through a distal outlet opening on a distal end of the medical implant delivery catheter;~~

~~advancing the medical implant delivery catheter through a side outlet opening on a distal portion of the outer delivery catheter and piercing tissue at a target tissue site using the puncturing component extending through the distal outlet opening to form an opening in the tissue;~~

~~extending a distal portion of the medical implant delivery catheter through the opening formed in the tissue; and~~

~~deploying the medical implant device positioned on the distal portion of the medical implant delivery catheter into the opening formed in the tissue.~~

~~17. The method of claim 16, further comprising inserting a radially expandable member positioned on a distal portion of a puncture needle sheath in the opening formed in the tissue, and expanding the radially expandable member to enlarge the opening, wherein the~~

~~puncture needle sheath slidably extends through the puncture needle lumen, and the puncture needle slidably extends through a lumen of the puncture needle sheath.~~

~~18. The method of claim 17, further comprising exchanging the puncture needle for a medical implant delivery guide wire and inserting the medical implant delivery guide wire through the lumen of the puncture needle sheath.~~

~~19. The method of claim 16, further comprising inserting a distal portion of the medical implant delivery catheter into the opening formed at the target tissue site to enlarge the opening.~~

~~20. The method of any of claims 16 to 19, further comprising orienting a distal portion of the medical implant delivery catheter within the medical implant delivery lumen and extending the distal portion through the side outlet opening, wherein orienting comprises rotating the distal portion of the medical implant delivery catheter to match a shape of a lateral cross section of the distal portion with a shape of the side outlet opening, and wherein the lateral cross section extends along a lateral dimension of the distal portion of the outer delivery catheter.~~

~~21. The method of any of claims 16 to 20, further comprising expanding an expandable anchor on the distal portion of the outer delivery catheter to contact the expandable anchor with a wall of the vessel.~~

~~22. The method of any of claims 16 to 21, wherein positioning the guide wire into a vessel comprises positioning the guide wire transfemorally into a coronary sinus through a right atrium via an ostium of the coronary sinus.~~

~~23. The method of any of claims 16 to 22, wherein piercing tissue at the target tissue site comprises piercing tissue of a left atrial wall to form the opening in the left atrial wall, and wherein deploying the medical implant device comprises deploying the medical implant device into the opening formed in the left atrial wall.~~

~~24~~16. A medical implant delivery system comprising:

a puncture needle comprising an elongate portion and a puncture component at a distal end of the elongate portion, the puncture component being configured to pierce tissue to form an opening in the tissue;

a medical implant delivery catheter comprising a puncture needle lumen and the puncture needle being configured to slidably extend through the puncture needle lumen, and the puncture component being configured to extend through a puncture needle outlet opening at a distal end of the medical implant delivery catheter;

a medical implant device carried on the medical implant delivery catheter;

an elongate housing adjacent to and slidable relative to the medical implant delivery catheter, wherein a distal end of the elongate housing is distal of the distal end of the medical implant delivery catheter when the medical implant delivery catheter is in a retracted configuration; and

an outer sheath around a portion of the medical implant delivery catheter and the elongate housing to maintain the medical implant delivery catheter adjacent to the elongate housing, wherein the outer sheath is slidable relative to the medical implant delivery catheter and extends over the distal end of the medical implant delivery catheter when the medical implant delivery catheter is in the retracted configuration.

~~25~~17. The system of claim ~~24~~16, wherein the elongate housing comprises a recess along at least a portion of a length of the elongate housing, a portion of the medical implant delivery catheter being received in the recess.

~~26~~18. The system of claim ~~24~~ 16 or ~~25~~17, wherein the elongate housing comprises a guide wire lumen configured to receive an elongate housing guide wire, and the distal end of the elongate housing comprises a guide wire outlet opening configured to allow extension therethrough of the elongate housing guide wire.

~~27~~19. The system of any of claims ~~24~~ 16 to ~~26~~18, wherein the medical implant delivery catheter comprises a first tapered distal portion comprising a first pre-formed curvature and the elongate housing comprises a second tapered distal portion comprising a second pre-formed curvature, wherein the first pre-formed curvature and the second pre-formed curvature comprise the same orientation.

~~28~~20. The system of claim ~~27~~19, and the first pre-formed curvature comprises a radius of curvature smaller than that of the second pre-formed curvature.

~~29~~21. The system of claim ~~27~~19, wherein the second pre-formed curvature comprises a shape configured to conform to a curvature along a length of a coronary sinus.

~~30~~22. The system of any of claims ~~24~~ 16 to ~~29~~21, further comprising an expandable anchor on the distal portion of the elongate housing opposite a portion of the elongate housing adjacent to the medical implant delivery catheter, the expandable anchor being configured to assume an expanded configuration to position the medical implant delivery catheter against a target tissue site.

~~31~~23. The system of claim ~~30~~22, wherein the elongate housing comprises a second tapered distal portion comprising a second pre-formed curvature and the expandable anchor is on an outer edge of the second pre-formed curvature.

~~32~~24. The system of any of claims ~~24~~ 16 to ~~31~~23, further comprising:

a puncture needle sheath slidably extending through the puncture needle lumen, and the puncture needle sheath slidably extending through the puncture needle; and

a radially expandable member on a distal portion of the puncture needle sheath, the radially expandable member being configured to enlarge the opening formed in the tissue.

~~33~~25. The system of claim ~~32~~24, wherein the puncture needle is configured to be exchangeable for a medical implant delivery guide wire.

~~34. A method for delivering a medical implant device, the method comprising:~~

~~positioning a guide wire into a vessel;~~

~~advancing a medical implant delivery system along the guide wire into the vessel, the medical implant delivery system comprising:~~

~~an elongate housing,~~

~~a medical implant delivery catheter adjacent to the elongate housing, the medical implant delivery catheter carrying a medical implant device and comprising a puncture needle lumen,~~

~~a puncture needle slidably extending through the puncture needle lumen, and a puncture component of the puncture needle extending through a distal outlet opening on a distal end of the medical implant delivery catheter, and~~

~~an outer sheath around the elongate housing and the medical implant delivery catheter;~~

~~proximally sliding the outer sheath to release a distal portion of the medical implant delivery catheter;~~

~~distally sliding the medical implant delivery catheter relative to the elongate housing and piercing tissue at a target tissue site to form an opening in the tissue using the puncture component extending through the distal outlet opening of the medical implant delivery catheter;~~

~~extending the distal portion of the medical implant delivery catheter through the opening in the tissue; and~~

~~deploying the medical implant device carried on the medical implant delivery catheter into the opening.~~

~~35. The method of claim 34, further comprising positioning a radially expandable member on a distal portion of a puncture needle sheath in the opening formed in the tissue, and expanding the radially expandable member to enlarge the opening, wherein the puncture needle sheath slidably extends through the puncture needle lumen, and the puncture needle slidably extends through a lumen of the puncture needle sheath.~~

~~36. The method of claim 35, further comprising exchanging the puncture needle for a medical implant delivery guide wire and inserting the medical implant delivery guide wire through the lumen of the puncture needle sheath.~~

~~37. The method of claim 34, further comprising inserting the distal portion of the medical implant delivery catheter into the opening formed at the target tissue site to enlarge the opening.~~

~~38. The method of any of claims 34 to 37, further comprising expanding an expandable anchor on a distal portion of the elongate housing to contact the expandable anchor with a wall of the vessel.~~

~~39. The method of any of claims 34 to 38, wherein positioning the guide wire into the vessel comprises positioning the guide wire transfemorally into a coronary sinus through a right atrium via an ostium of the coronary sinus.~~

~~40. The method of any of claims 34 to 39, wherein piercing tissue at the target tissue site comprises piercing tissue of a left atrial wall, and wherein deploying the medical implant device comprises deploying the medical implant device into the opening formed in the left atrial wall.~~