not transferred to the face of the embolus because the orifice at the tip of the catheter does not form a suitable seal with the emboli 80. Another case of failed aspiration can be seen in Figure 3, where the embolus 90 has an irregular surface that prevents the suction force of aspiration to be transferred to the face of the embolus.

SUMMARY

According to an aspect of the present disclosure, there is provided an aspiration catheter, the catheter comprising a catheter body having a lumen; and a tip comprising a plurality of engagement extensions at a distal end of the tip, a support ring, and a frame comprising a first helical frame and a second helical frame, wherein the frame connects connecting the plurality of engagement extensions to the support ring, wherein the tip is connected to a distal portion of the catheter body, wherein the plurality of engagement extensions has a gap in between each engagement extension, and wherein at least one engagement extension of the plurality of extensions is configured to move independently of other extensions of the plurality of extensions.

Apparatus and methods are described for assisting in manipulating objects in the body, including for example a body lumen, and including for example unwanted objects such as emboli or stones. In one example, an adaptable tip for a catheter includes a portion for engaging the object in the body, and in one example the adaptable tip is on a distal end portion of an aspiration catheter. In the foregoing examples, the adaptable tip may include a frame, skeleton, or network structure (referred to herein collectively as “frame”) that is axially flexible, and in some examples axially resiliently flexible, for example having a restoring function similar to a spring function. In any of the foregoing examples, the frame may be both axially and radially flexible, including resiliently flexible. Also in any of the foregoing examples, the frame can have a number of configurations, including one or more helical configurations, a frame having multiple nodes, a frame having struts forming parallelograms and/or a frame having multiple linear struts, adjacent ones of which are coupled at respective nodes. In any of the foregoing examples, the frame can be formed so that axial reduction of a length of the frame results in a reduction in an inside diameter of the frame, and in another frame

configuration axial reduction of a length of the frame results in an increase in an inside diameter of the frame. In any one or more of the foregoing examples, the frame is axially bendable or movable so that a central axis of the frame can be bent or curved. Therefore, in one or more of the examples of a frame, the frame can be axially, directionally and/or radially variable during normal use, for example changing from a neutral configuration to a flexed and/or compressed configuration. In any of the foregoing examples, the frame may be embedded or encased in or surrounded by an elastic polymer material, for example a fluid impermeable material to form a shroud or cover for the external surface of the frame. The elastomeric polymer