

Claims

What is claimed is:

1. An endoscopic system configurable to be provided in a cavity of a patient, the endoscopic system comprising:

a main body, the main body being an elongated body having a first end;

an anchor assembly attached to the main body near the first end of the main body, the anchor assembly comprising:

a first expandable member, the first expandable member configurable to expand radially away from the main body;

a second expandable member provided between the first expandable member and the first end of the main body, the second expandable member configurable to expand radially away from the main body; and

a suction opening provided between the first expandable member and the second expandable member, the suction opening configurable to apply a negative pressure; and

a pressure control subsystem configurable to provide a negative pressure to the suction opening;

wherein the anchor assembly is operable to secure the main body with respect to an interior wall forming the cavity of the patient by expanding the first expandable member to contact the interior wall forming the cavity of the patient, expanding the second expandable member to contact the interior wall forming the cavity of the patient, and applying, by the pressure control subsystem via the suction opening, the negative pressure to a region between the expanded first expandable member, the expanded second expandable member, the interior wall forming the cavity of the patient, and the main body.

2. The endoscopic system of claim 1, wherein the expanding of one or more of the first and second expandable members correspond with the negative pressure applied through the suction opening.
3. The endoscopic system of claim 1, wherein a surface of one or more of the first and second expandable members contacting the interior wall forming the cavity of the patient comprise a surface pattern, roughness, and/or protrusion, wherein the securing of the main body with respect to the interior wall forming the cavity of the patient further comprises resisting, by the surface pattern, roughness, and/or protrusion, a movement of one or more of the first and second expandable members contacting the interior wall forming the cavity of the patient with respect to the interior wall forming the cavity of the patient.
4. The endoscopic system of claim 1, further comprising a head assembly, the head assembly having a first end portion and a second end portion opposite to the first end portion, the first end portion of the head assembly attachable to the first end of the main body, the second end portion of the head assembly selectively configurable to actuate in a plurality of directions with respect to the first end portion of the head assembly.
5. The endoscopic system of claim 4, wherein the head assembly further comprises a plurality of movement control cavities, each movement control cavity configurable to receive a filler; and

wherein the second end portion is actuated in the plurality of directions by selectively controlling the filler in one or more of the plurality of movement control cavities.
6. The endoscopic system of claim 4, wherein the head assembly further comprises an image capturing assembly, the image capturing assembly configurable to capture an image.
7. The endoscopic system of claim 6, wherein the head assembly is configurable to provide an instrument at the second end portion of the head assembly, the instrument for use in performing an in vivo procedure in the cavity of the patient.

8. The endoscopic system of claim 1, wherein the main body further comprises a plurality of cavities, including a first cavity and a second cavity, the first cavity operable to provide a filler to expand the first expandable member, and the second cavity in communication with the pressure control subsystem and the suction opening.

9. The endoscopic system of claim 1, further comprising:

a second main body, the second main body having a first end and a main cavity, the main cavity housing at least a portion of the main body, wherein the main body and the second main body are slidable with respect to each other;

a second anchor assembly attached to the second main body near the first end of the second main body, the second anchor assembly comprising:

a third expandable member, the third expandable member configurable to expand radially away from the second main body; and

a fourth expandable member provided between the third expandable member and the first end of the second main body, the fourth expandable member configurable to expand radially away from the second main body;

wherein the second anchor assembly is operable to secure the second main body with respect to the interior wall forming the cavity of the patient by expanding the third expandable member to contact the interior wall forming the cavity of the patient and expanding the fourth expandable member to contact the interior wall forming the cavity of the patient.

10. The endoscopic system of claim 9, further comprising a pressure control subsystem configurable to provide a negative pressure;

wherein the second anchor assembly further comprises a second suction opening provided between the third expandable member and the fourth expandable member, the

second suction opening configurable to apply a negative pressure provided by the pressure control subsystem;

wherein the securing, by the second anchor assembly, of the second main body with respect to the interior wall forming the cavity of the patient further comprises:

applying, by the pressure control subsystem via the second suction opening, the negative pressure to a region between the expanded third expandable member, the expanded fourth expandable member, the interior wall forming the cavity of the patient, and the second main body.

11. The endoscopic system of claim 9, wherein a surface of one or more of the third and fourth expandable members contacting the interior wall forming the cavity of the patient comprise a surface pattern, roughness, and/or protrusion, wherein the securing of the second main body with respect to the interior wall forming the cavity of the patient further comprises resisting, by the surface pattern, roughness, and/or protrusion, a movement of one or more of the third and fourth expandable members contacting the interior wall forming the cavity of the patient with respect to the interior wall forming the cavity of the patient.

12. The endoscopic system of claim 6, further comprising a controller in communication with the head assembly, the controller operable to control the image capturing assembly, the controller further operable to actuate the direction of the second end portion of the head assembly.

13. The endoscopic system of claim 12, wherein the actuating the direction of the second end portion of the head assembly is based on the image captured by the image capturing assembly and/or a sensor provided at the second end portion of the head assembly.

14. The endoscopic system of claim 12, wherein the controller is further operable to control the instrument provided at the second end portion of the head assembly to perform the in vivo procedure in the cavity of the patient.

15. The endoscopic system of claim 14, wherein the controlling of the instrument to perform the in vivo procedure in the cavity of the patient is based on the image captured by the image capturing assembly and/or the sensor provided at the second end portion of the head assembly.

16. The endoscopic system of claim 1, further comprising a controller in communication with the anchor assembly, the controller operable to control the expanding of the first expandable member and the second expandable member.

17. An endoscopic system configurable to be provided in a cavity of a patient, the endoscopic system comprising:

- a main body, the main body being an elongated body having a first end;

- a head assembly, the head assembly having:

- a first end portion and a second end portion opposite to the first end portion, the first end portion attachable to the first end of the main body, the second end portion selectively configurable to actuate in a plurality of directions with respect to the first end portion;

- an image capturing assembly provided in the second end portion, the image capturing assembly configurable to capture an image; and

- an instrument section provided in the second end portion, the instrument section configurable to provide an instrument, the instrument for use in performing an in vivo procedure in the cavity of the patient;

- a second main body, the second main body having a first end and a main cavity, the main cavity housing at least a portion of the main body, wherein the main body and the second main body are slidable with respect to each other; and

- a second anchor assembly attached to the second main body near the first end of the second main body, the second anchor assembly having:

a first expandable member, the first expandable member configurable to expand radially away from the second main body; and

a second expandable member provided between the first expandable member and the first end of the second main body, the second expandable member configurable to expand radially away from the second main body;

wherein the second anchor assembly is operable to secure the second main body with respect to an interior wall forming the cavity of the patient by expanding the first expandable member to contact the interior wall forming the cavity of the patient and expanding the second expandable member to contact the interior wall forming the cavity of the patient.

18. The endoscopic system of claim 17, wherein the head assembly further comprises a plurality of movement control cavities, each movement control cavity configurable to receive a filler; and

wherein the second end portion is actuated in the plurality of directions by selectively controlling the filler in one or more of the plurality of movement control cavities.

19. The endoscopic system of claim 17, wherein, when the head assembly is transported through the cavity of the patient, the direction of movement of the head assembly is controllable by actuating the direction of the second end portion of the head assembly with respect to the first end portion.

20. The endoscopic system of claim 17, further comprising an anchor assembly attached to the main body near the first end of the main body, the anchor assembly comprising:

a third expandable member, the third expandable member configurable to expand radially away from the main body;

wherein the anchor assembly is operable to secure the main body with respect to an interior wall forming the cavity of the patient by expanding the third expandable member to contact the interior wall forming the cavity of the patient.

21. The endoscopic system of claim 20, wherein the anchor assembly further comprises a fourth expandable member, the fourth expandable member configurable to expand radially away from the main body;

wherein the securing, by the anchor assembly, of the main body with respect to the interior wall forming the cavity of the patient further comprises expanding the fourth expandable member to contact the interior wall forming the cavity of the patient.

22. The endoscopic system of claim 21, further comprising a pressure control subsystem configurable to provide a negative pressure;

wherein the anchor assembly further comprises a suction opening provided between the third expandable member and the fourth expandable member, the suction opening configurable to apply the negative pressure provided by the pressure control subsystem; and

wherein the securing, by the anchor assembly, of the main body with respect to the interior wall forming the cavity of the patient further comprises:

applying, by the pressure control subsystem via the suction opening, the negative pressure to a region between the expanded third expandable member, the expanded fourth expandable member, the interior wall forming the cavity of the patient, and the main body.

23. The endoscopic system of claim 17, further comprising a pressure control subsystem configurable to provide a negative pressure;

wherein the second anchor assembly further comprises a second suction opening provided between the first expandable member and the second expandable member, the second suction opening configurable to apply the negative pressure provided by the pressure control subsystem; and

wherein the securing, by the second anchor assembly, of the second main body with respect to the interior wall forming the cavity of the patient further comprises:

applying, by the pressure control subsystem via the second suction opening, the negative pressure to a region between the expanded first expandable member, the expanded second expandable member, the interior wall forming the cavity of the patient, and the second main body.

24. The endoscopic system of claim 17, further comprising a controller in communication with the head assembly, the controller operable to control the image capturing assembly, the controller further operable to actuate the direction of the second end portion of the head assembly.

25. The endoscopic system of claim 24, wherein the actuating the direction of the second end portion of the head assembly is based on the image captured by the image capturing assembly and/or a sensor provided at the second end portion of the head assembly.

26. The endoscopic system of claim 24, wherein the controller is further operable to control the instrument provided at the second end portion of the head assembly to perform the in vivo procedure in the cavity of the patient.

27. The endoscopic system of claim 26, wherein the controlling of the instrument to perform the in vivo procedure in the cavity of the patient is based on the image captured by the image capturing assembly and/or the sensor provided at the second end portion of the head assembly.

28. An endoscopic system configurable to be provided in a cavity of a patient, the endoscopic system comprising:

a main body, the main body being an elongated body having a first end;

an anchor assembly attached to the main body near the first end of the main body, the anchor assembly comprising:

a first expandable member, the first expandable member configurable to expand radially away from the main body; and

a second expandable member provided between the first expandable member and the first end of the main body, the second expandable member configurable to expand radially away from the main body;

a second main body, the second main body having a first end and a main cavity, the main cavity housing at least a portion of the main body, wherein the main body and the second main body are slidable with respect to each other; and

a second anchor assembly attached to the second main body near the first end of the second main body, the second anchor assembly having:

a third expandable member, the third expandable member configurable to expand radially away from the second main body; and

a fourth expandable member provided between the third expandable member and the first end of the second main body, the fourth expandable member configurable to expand radially away from the second main body;

wherein the anchor assembly is operable to secure the main body with respect to an interior wall forming the cavity of the patient by expanding the first expandable member to contact the interior wall forming the cavity of the patient and expanding the second expandable member to contact the interior wall forming the cavity of the patient; and

wherein the second anchor assembly is operable to secure the second main body with respect to the interior wall forming the cavity of the patient by expanding the third expandable member to contact the interior wall forming the cavity of the patient and expanding the fourth expandable member to contact the interior wall forming the cavity of the patient.

29. The endoscopic system of claim 28, further comprising a pressure control subsystem configurable to provide a negative pressure;

wherein the anchor assembly further comprises a suction opening provided between the first expandable member and the second expandable member, the suction opening configurable to apply the negative pressure provided by the pressure control subsystem; and

wherein the securing, by the anchor assembly, of the main body with respect to the interior wall forming the cavity of the patient further comprises:

applying, by the pressure control subsystem via the suction opening, the negative pressure to a region between the expanded first expandable member, the expanded second expandable member, the interior wall forming the cavity of the patient, and the main body.

30. The endoscopic system of claim 29, wherein the expanding of one or more of the first and second expandable members correspond with the negative pressure applied through the suction opening.

31. The endoscopic system of claim 28, wherein a surface of one or more of the first and second expandable members contacting the interior wall forming the cavity of the patient comprise a surface pattern, roughness, and/or protrusion, wherein the securing of the main body with respect to the interior wall forming the cavity of the patient further comprises resisting, by the surface pattern, roughness, and/or protrusion, a movement of one or more of the first and second expandable members contacting the interior wall forming the cavity of the patient with respect to the interior wall forming the cavity of the patient.

32. The endoscopic system of claim 28, further comprising a head assembly, the head assembly having a first end portion and a second end portion opposite to the first end portion, the first end portion of the head assembly attachable to the first end of the main body, the second end portion of the head assembly selectively configurable to actuate in a plurality of directions with respect to the first end portion of the head assembly.

33. The endoscopic system of claim 32, wherein the head assembly further comprises a plurality of movement control cavities, each movement control cavity configurable to receive a filler; and

wherein the second end portion is actuated in the plurality of directions by selectively controlling the filler in one or more of the plurality of movement control cavities.

34. The endoscopic system of claim 32, wherein the head assembly further comprises an image capturing assembly, the image capturing assembly configurable to capture an image.

35. The endoscopic system of claim 34, wherein the head assembly is configurable to provide an instrument at the second end portion of the head assembly, the instrument for use in performing an in vivo procedure in the cavity of the patient.

36. The endoscopic system of claim 29, wherein the main body further comprises a plurality of cavities, including a first cavity and a second cavity, the first cavity operable to provide a filler to expand the first expandable member, and the second cavity in communication with the pressure control subsystem and the suction opening.

37. The endoscopic system of claim 28, further comprising a pressure control subsystem configurable to provide a negative pressure;

wherein the second anchor assembly further comprises a second suction opening provided between the third expandable member and the fourth expandable member, the second suction opening configurable to apply a negative pressure provided by the pressure control subsystem;

wherein the securing, by the second anchor assembly, of the second main body with respect to the interior wall forming the cavity of the patient further comprises:

applying, by the pressure control subsystem via the second suction opening, the negative pressure to a region between the expanded third expandable member, the

expanded fourth expandable member, the interior wall forming the cavity of the patient, and the second main body.

38. The endoscopic system of claim 28, wherein a surface of one or more of the third and fourth expandable members contacting the interior wall forming the cavity of the patient comprise a surface pattern, roughness, and/or protrusion, wherein the securing of the second main body with respect to the interior wall forming the cavity of the patient further comprises resisting, by the surface pattern, roughness, and/or protrusion, a movement of one or more of the third and fourth expandable members contacting the interior wall forming the cavity of the patient with respect to the interior wall forming the cavity of the patient.

39. The endoscopic system of claim 34, further comprising a controller in communication with the head assembly, the controller operable to control the image capturing assembly, the controller further operable to actuate the direction of the second end portion of the head assembly.

40. The endoscopic system of claim 39, wherein the actuating the direction of the second end portion of the head assembly is based on the image captured by the image capturing assembly and/or a sensor provided at the second end portion of the head assembly.

41. The endoscopic system of claim 39, wherein the controller is further operable to control the instrument provided at the second end portion of the head assembly to perform the in vivo procedure in the cavity of the patient.

42. The endoscopic system of claim 41, wherein the controlling of the instrument to perform the in vivo procedure in the cavity of the patient is based on the image captured by the image capturing assembly and/or the sensor provided at the second end portion of the head assembly.

43. The endoscopic system of claim 28, further comprising a controller in communication with the anchor assembly, the controller operable to control the expanding of the first expandable member and the second expandable member.