Adaptively morphing surgical grasper

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Invention

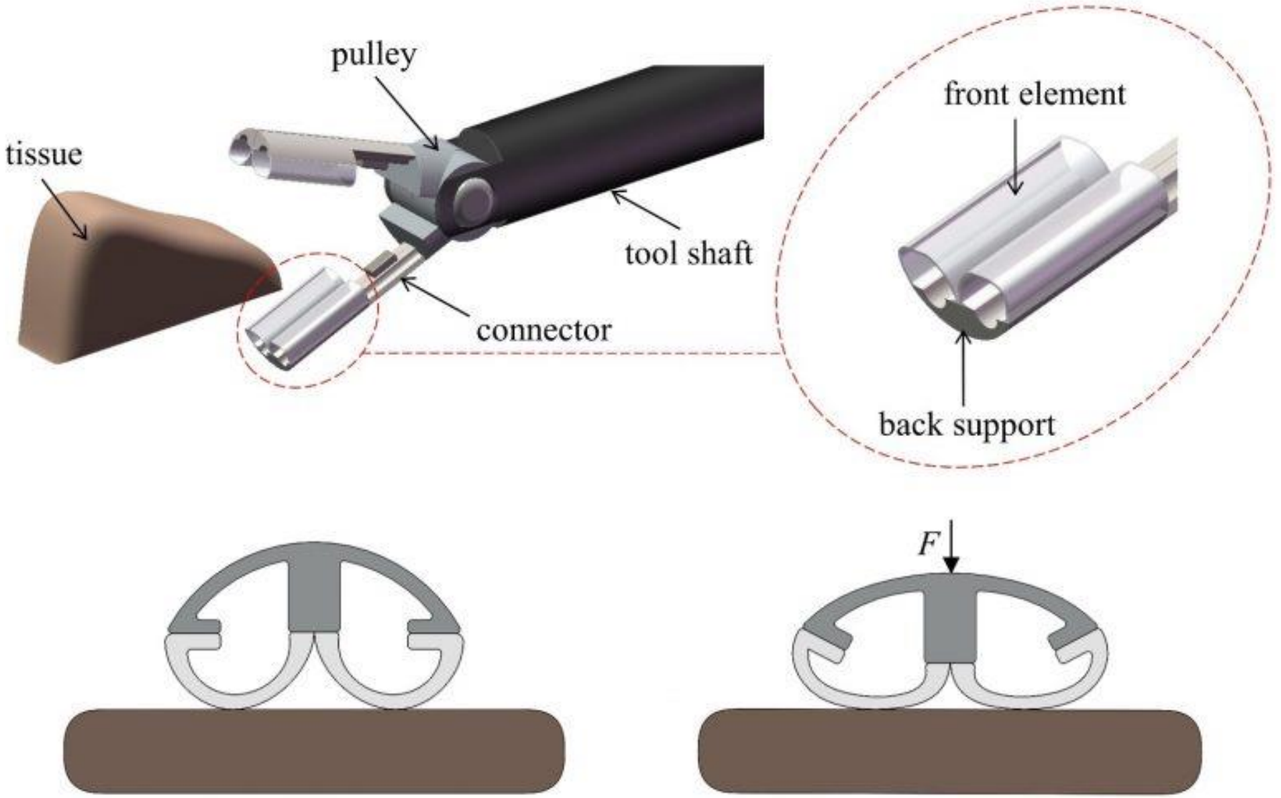
The invention relates to a compliant grasper able to safely and effectively clutch tissue during minimally invasive surgery. It features two passively morphing jaws: upon clutching, they adaptively increases the contact area with tissue, thus reduces the stress applied therein. Thanks to its intrinsic compliance, the adaptively morphing grasper can engage with tissue more respectfully than conventional rigid jaw graspers.

The present surgical instrument comprises a distal end effector, devised to grasp or retract soft tissue, compatible with both robotics (teleoperated) and traditional (manual) laparoscopic surgery. The distal portion includes a back support (BS) with a deformable profile, and a deformable front element (FE) more compliant than back support.

When clutching tissue, the end effector morphs by deforming along the transversal direction (i.e. perpendicular to the tool shaft), so as to increase the contact area. The end effector exerts clutch forces (F) large enough to achieve effective grasping, while fostering safe tool-tissue interaction thanks to stress redistribution during morphing. Its implementation does not increase tool complexity, since it relies on passive deformation (no additional sensing/actuation units are needed).

IIT Istituto Italiano di Tecnologia is a co-owner of the patent.

Drawings
& pictures



Industrial applications

The industrial applicability of this technology:

- Graspers for tissue clutching during minimally invasive surgery
- Compliant (soft material) grasper for handling delicate objects

Possible developments

The research group is interested in obtaining industrial collaborations aimed at increasing the technological maturity of the present invention or industrial partners interested in taking the license of the technology object of this patent.

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