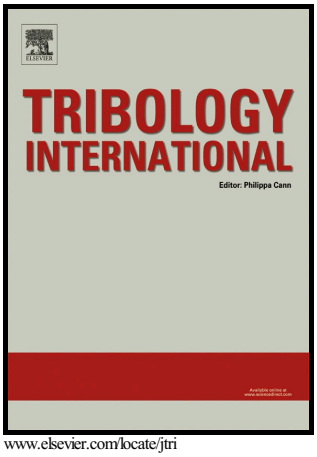

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The Undamaged Tissue Grasping in a Laparoscopic Surgical Grasper via Distributed Pressure Measurement

Bilsay Sümer[a,*], Mithat Can Ozin[b], Turgay Eray[b], İlker Murat Koç[b]

[a]*Dept. of Mech. Eng., Hacettepe University, Beytepe, 06800, Ankara, Turkey*
[b]*Dept. of Mech. Eng., Istanbul Technical University, Gumussuyu, 34437, Beyoglu, Istanbul, Turkey*

Abstract

The grasping action in a minimally invasive surgery operation is a blind operation in terms of the touch feedback and may result an undesirable tissue damage during the surgery. In this study, the interaction of the minimally invasive surgery tool with the tissue investigated by integrating a high resolution tactile sensor to the end-effector of the tool. The pressure distribution during the closing action of the grasper is characterized using the non-organic viscoelastic materials as well as organic tissues such as dead chicken liver and meat. Pressure mapping is used to calculate the net grasping force acting on the contact interface. The results show the total grasping force changes in the range of 0.2-0.7 N for different type of tissues.

Keywords: Laparoscopic grasper, Pressure distribution, Tactile measurement, Center of pressure

1. Introduction

Nowadays, laparoscopic surgery is a popular surgical method due to its established benefits to the patients over the conventional open surgery. Some of the benefits can be listed as the lower risk of infection and hemorrhaging, less pain, drug usage and recovery after the surgical operation and superior cosmetic conditions [1, 2]. The current tehcnology of the MIS involves the visualization of the surgical area via a video camera and performing necessary surgical operations with the laparoscopic surgical instruments. The

*Corresponding author
Email address: bsumer@hacettepe.edu.tr (Bilsay Sümer)