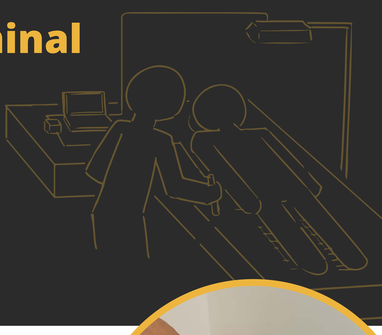
Digitizing abdominal palpation with a pressure measurement and positioning device



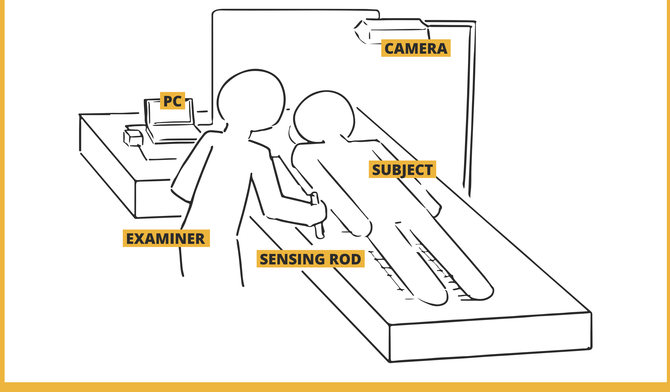
BACKGROUND

An **abdominal physical examination is one of the most important tools in evaluating patients with acute abdominal pain**. We focused on palpation, in which assessment is made according to the patient's response and force feedback. Since palpation is performed manually by the examiner, the uniformity of force and location is difficult to achieve during examinations. **We propose an integrated system to quantify palpation pressure and location.**

EXPERIMENTAL SETUP

A force sensor continuously collects pressure data, while a camera locates the precise position of contact. The system records and displays average and maximum pressure by creating a pressure/time curve for computer-aided diagnosis.

Compared with previous work on quantifying abdominal palpation with pressure sensors, **our proposed system uses an integrated approach to measure palpation force and track the corresponding position at the same time for further diagnosis**. In addition, we only make use of a sensing device and a general web camera, rather than commercial algometry and infrared cameras used in the previous work.



PARTICIPANTS & METHODOLOGY

Based on our clinical trials, the statistics of palpation pressure values and the corresponding findings are also reported. **We performed abdominal palpation with our system on twenty-three healthy participants, including fourteen males and nine females.** We applied two grades of force on the abdomen (light and deep) using four-quadrant and nine-region schemes, then recorded the value of pressure and location.

RESULTS

In the four-quadrant scheme, the average pressures of abdominal palpation with light and deep force levels were 0.506 (N) and 0.552 (N), respectively. In the nine-region scheme, the average pressures were 0.496 (N) and 0.577 (N), respectively. Two episodes of contact dermal reaction were identified. **According to our experiment statistics, there is no significant difference in the force level between the four-quadrant and nine-region scheme.**

CONCLUSION

Our results have the potential to be used as a reference guide while designing digital abdominal palpation devices.

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