Developmet of Infrared marker for Thormoplastic immobilization tool

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Purpose:
Although the thermoplastic immobilization tool is used to efficiently control of patient movement, movement of the patient's skin surface under thermoplastic immobilization tool exists. In addition, the thermoplastic immobilization tool is used as a method of covering the skin surface, which makes it difficult to visually check the skin surface movement. Therefore, the aim of this study is to develop an Infrared (IR) marker that visually checks the movement of the patient's skin surface even used the thermoplastic immobilization tool.

Materials and Methods:
Modeling of IR marker was performed using 3D modeling software. The structure of the IR marker was consisting of a spherical IR marker, a cylindrical marker posts to be attached to the skin and a disk-shaped marker base between IR marker and cylindrical marker posts. The disk-shaped marker base has a number of holes to be combined with the cylindrical marker posts. The design of this disk-shaped marker base allows the cylindrical marker posts to be positioned freely, allowing the IR marker to be located on the patient skin surface without interference with the thermoplastic immobilization tool. Confirmation of the developed IR marker is performed by locating the IR marker on the patient's skin surface along with the thermoplastic immobilization tool. We also developed the IR marker motion checking program. Using this program and IR marker, the movement of the patient's skin surface under the thermoplastic immobilization tool is checked.

Results:
The IR marker was developed to detect patient surface movement under the thermoplastic immobilization tool. The IR marker was modeled using a 3D modeling software and the structure was printed using a 3D printer. When the IR markers were located on the patient skin surface along with the thermoplastic immobilization tool, we confirmed that it is well located on without any other problems. And we confirmed that the IR marker motion checking program detects the movement of the IR marker well. However, experiments that check the movement of the patient's skin surface were still underway, therefore no results were obtained.

Conclusions:
We have developed the IR marker for the thermoplastic immobilization tool and the developed IR marker was confirmed to be suitable for our purpose. Further study, we will verify with the stereo vision that the developed IR marker detects movement of the patient's surface.

Keywords:
Infrared marker, 3D printing, Immobilization tool