Future subject of LASER scalpel operational performance

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Introduction;

The CO₂ LASER scalpel developed in the nineteen-seventies, however, these types have some problems concerning reliability, especially hand vibration on the operation. It was considered these problems arise from operations of machine control and light guided method.

Machine control is divided into before and after operations. Before operations are preparations as follows, power control and inspection of gas pressure. After are putting in order focusing head and manipulator arm. These are very significant for operational reliability on surgical operation. Simplification of these operations does a major service to surgical operational exactness.

Two light guided methods are developed. They are mirror joint light guided way and flexible one. The former consists of some mirror joints and the latter is light fiber. As mirror joints caused vibration on manipulator arm, fiber type was developed to decrease it. On incipient fiber, light guided way was very thick and it's operation was not enough. Another technological innovation brought a new fiber whose guided way was very thin. In result, operational performance of hand made rapid progress.

Then we had carried out worker process analysis on preparations and putting in order, and tried experimental evaluation of the operational performance regarding hand vibration.

Research Method;

(1) Experimental method

Worker process

were investigated in connection with before and after machine control works. The experimental evaluation were carried out using three type light guided ways. They were mirror joint, thin fiber and another thin fiber

Fig.1

which had a feed back arm. Two operational surfaces were used. One surface was flat and another was slope(Fig.1). Each surfaces were carved 300x3x100 mm ditch. Each ditches were equiped with electrode. One mm electrode was equiped with focusing head. When the electrode of focusing head was touched on another electrode, little current streams. These were integrated with polygraph.

(2) Subject

The subjects are selected among male graduste students and post graduate students of age from 21 to 25 years old.

Results;

(1) Worker process analysis

On the mirror joint type, twenty-eight Operations were observed. Transportation was eleven, Storage or Delay was zero and Inspection was nine process. In totality forty-eight process were observed. On the fiber type, Operation was twenty-six, Transportation was seven, Storage or Delay was zero, Inspection was two process and in totality thirty process were observed.

(2) Operational performance

The vibration of mirror joint type was the most frequent, the second was fiber and feed back type was the lowest.

Discussion;

The difference between mirror joint and fiber type was discussed. As the worker process analysis, mirror joint type had more frequent process than the fiber type. On the fiber type, in totality twenty-seven percent process were decreased rather than compared with the feed back type. Especially, seventy-eight percent process on Inspection were cut down.

Difference of operational performance were observed between each type. Feed back type was effective on each direction. On the feed back type, mean values pointed out low degree, but the standard deviation of 135° was large and it's operational performance were decreased. Fiber type was seventy percent rather than mirror joint type and feed back type was about twenty percent rather than mirror joint one. It was considered due to effect of feed back arm.

Conclusion;

Future subjects are as follows.

- (1) Designing more flexible light guided ways.
- (2) Stepping up the feed back on the touching system.
- (3) Drawing up the operational manual.