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Effect of Comforting Touch on Surface Electromyogram during Upper Gastrointestinal Endoscopy

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Abstract Comforting touch is an integral aspect of nursing care. Health care providers touch can help patients to ease their discomfort. In the present study, using surface electromyography, we investigated the effect of comforting touch on patient's feeling during upper gastrointestinal endoscopy without sedation. Twenty-seven patients, aged from 23 to 75 years, were informed of this study and consented to participate. During the examination, subjects were in supine position. Integrated electromyogram (IEMG) of sternocleidomastoid and trapezius muscles of 17 patients was recorded during upper gastrointestinal endoscopy and comforting touch on their shoulder or arm (touch group) and of 10 patients during upper gastrointestinal endoscopy (control group). IEMG was decreased by about 50% in the touch group while very little change was observed in the control group. The difference between the two groups was statistically significant. Because the decrease in IEMG indicates relief of muscular strain induced by comforting touch, the results of this study suggest that comforting touch can relieve muscular strain during upper gastrointestinal endoscopy. The intended use of comforting touch should be emphasized in nursing education and staff development programs.

Key words : Upper gastrointestinal endoscopy, Comforting touch, Surface electromyography

Introduction

With rapid progression of medical instruments and technology, upper gastrointestinal endoscopy (hereafter abbreviated to endoscopy) has played an important role in the diagnosis and treatment of digestive system diseases. Endoscopy is being more widely and generally used because of the extended human life span. Use of intravenous sedation in the examination of upper gastrointestinal endoscopy is controversial in Western countries. Intravenous pharmacological agents such as benzodiazepines for sedation are commonly used[1]. In Japan, topical oropharyngeal anesthesia with lidocaine is used to avoid adverse effects of intravenous premedication such as shock.

Patients suffer from fear and anxiety before the endoscopic examination. To reduce such mental stress, which prevents the patients from undergoing comfortable and smooth endoscopic examinations, they are informed of the endoscopy procedures and comforted as a nursing care through touch, including laying hands on, pressing and rub-

bing the shoulders and back of patients. Touch is found to relieve patient's strain and is also appreciated. Although there are a few studies on the potential benefits of touch, more scientific basis is necessary for placing touch as an important nursing care aid. In the present study, the effect of comforting touch on the relief of muscular strain was examined using surface electromyography.

Patients and methods

Subjects included 27 male and female outpatients requiring endoscopy at Hofu Institute of Gastroentelogy in Yamaguchi prefecture. All patients were informed of this study and consented to participate. Ages ranged from 23 to 75 years, with an average and standard deviation of 53.3 ± 15.0. During the endoscopy, a nurse comforted 17 patients with verbalization and touching (touch group) and the remaining 10 patients with only verbalization (control group).

This study was performed from August 1990 through September 1990. Endoscopy was always carried out in the morning. After measuring blood pressure with a mercurial manometer and taking pulses, the subjects were given a series of pretreatment including the oral administration of dimeticon, oropharyngeal anaesthesia using ethyl amino benzoate with 4% lidocaine, and muscular injection of 1ml scopolamine butyl bromide and 1ml atropine sulfate while in the endoscopy waiting room.

After entering the endoscopic examination room, the patients were instructed by a nurse to lie down in a left lateral recumbent position on the bed. Surface electromyograms of the sternocleidomastoid and trapezius muscles were recorded from the start of electronic endoscope insertion until its withdrawal. For recording muscle potential, bipolar electrodes were fixed on the surface of the skin over the sternocleidomastoid and trapezius muscles in parallel with the muscle fibers at a distance of 2.5 cm between the centers of the electrodes. A Multi-telemeter 511X (Nippon Denki Sanei, Tokyo, Japan) was used to record the electromyograms. Frequency range of the amplifiers was DC to 500Hz and 30 msec of time constant was used.

One physician performed the endoscopy while one nurse comforted the patient. For comforting touch, the nurse placed lightly her hand on the right shoulder covered with cloth or directly on the posterior region of the neck. The duration of touch was 3-5 seconds. To analyze the data, electromyograms were extracted from the period of 2.5 seconds before and after the first comforting touch and/or the first comforting word, the amplitudes of the extracted muscle potentials were integrated with respect to time using a Mediagraph MG-10 (NEC, Tokyo, Japan) and the integration of the amplitudes with respect to time was taken as integrated electromyogram (IEMG).

The χ^2 test or Fisher's exact probability test was used to analyze the difference of rate in the characteristics of subjects. Difference in average values of the IEMG was compared using non-paired t-test (Welch test when the variance significantly differed) or paired t-test. The values are expressed as mean± standard deviation.

Results

1. Characteristics of the subjects

Table 1 shows age, sex, and the history of previous endoscopies of the patients in both groups. Average age was nearly the same between both groups. The rate of male patients and those with previous endoscopies was higher in the control than touch group, though not statistically significant.

2. Example of surface electromyogram

Touch - induced changes of surface electromyogram of sternocleidomastoid muscle during endoscopic examination. These records were obtained from 3 subjects (Figure 1). During the comforting touch, the amplitudes of surface electromyograms were remarkably reduced.

3. IEMG before and during endoscopic insertion and during endoscopic examination.

The IEMG of the sternocleidomastoid muscle for 2.5 seconds in 27 subjects was 32.7 ± 33.4μV・s before endoscopic insertion, 185.7 ± 111.0μV・s during endoscopic insertion, and 199.0 ± 87.3μV・s during the endoscopic examination. That for the trapezius muscle was 8.7 ± 15.8μV・s before

Table 1. Characteristics of the subjects

	n	age(year) (m ± sd)	sex		history of previous endoscopy	
			male	female	negative	positive
Touch group	17	56.1 ± 13.3	10 (58.8%)	7 (41.2%)	5 (29.4%)	12 (70.6%)
Control group	10	48.4 ± 17.3	9 (90.0%)	1 (10.0%)	2 (20.0%)	8 (80.0%)

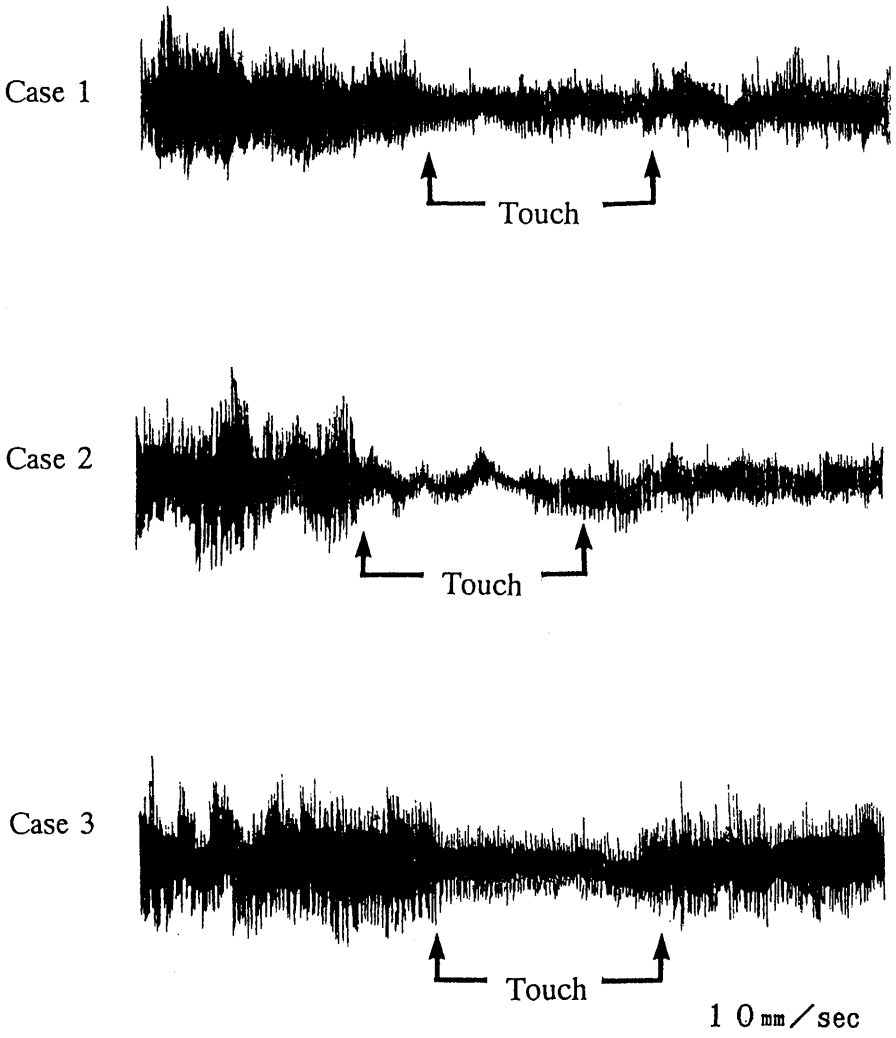

Fig. 1. Touch-induced changes of surface electromyogram of sternocleidomastoid muscle during endoscopic examination. These records were obtained from 3 suubjects.

Table 2. Decrease in integrated electromyogram during comforting touch

		integrated electromyogram for 2.5 seconds (μV·s)		
	muscle	before touch	after touch	rate of decrease(%)
During insertion of endoscopy				
Touch group	sternocleidomastoid	209.2± 91.6	98.5± 66.8**###	53.4±21.3
(n=17)	trapezius	162.9±124.8	71.5± 52.5**###	51.0±18.6
Control group	sternocleidomastoid	145.9±133.5	148.0±140.5	0.7±36.4
(n=10)	trapezius	158.6±123.5	155.7±115.4	-2.9±27.1
During endoscopic examination				
Touch group	sternocleidomastoid	199.4±109.9	84.9± 58.0***###	55.2±27.5
(n=17)	trapezius	150.7±112.1	64.0± 54.4**###	54.1±27.1
Control group	sternocleidomastoid	198.3± 23.2	189.2± 21.5	4.2± 9.7
(n=10)	trapezius	819.0± 47.2	806.2± 56.5	1.6± 2.8

1) m±sd
2) *** : $p<0.001$, ** : $p < 0.01$, significant difference from respective control group (non-paired t-test)
3) ### : $p<0.001$, signifference from respective values before touch (paired t-test)

insertion, 161.3 ± 122.0μV · s during insertion, and 398.2±341.6μV · s during theoperation. There were inter individual differences in the degree of muscle strain.

4. Rate of decrease in IEMG before and after touch.

To examine the effects of touch during endoscopy, the rate of decrease in the IEMG was compared between the touch and control groups (Table 2).

In the touch group, the rate of decrease in the IEMG was 53.4 ± 21.3% for the sternocleidomastoid muscle and 51.0 ± 18.6% for the trapezius muscle during insertion, and 55.2 ± 27.5% for the sternocleidomastoid muscle and 54.1 ± 27.1% for the trapezius muscle during the operation. In the control group, it was 0.7 ± 36.4% for the sternocleidomastoid muscle and 2.9 ± 27.1% for the trapezius muscle during insertion, and 4.2 ± 9.7% for the sternocleidomastoid muscle and 1.6 ± 2.8% for the trapezius during the operation.

The strain of the sternocleidomastoid or trapezius muscle was significantly reduced during endoscopic insertion ($p<0.01$) or during endoscopic examination ($p<0.01$) in the touch group but not in the control group.

Discussion

This study showed from the recorded changes in the surface electromyogram, that touch was effective in the relief of patient's strain. During insertion of the endoscope, patients with fear and pain are strained. A comforting touch, used as a nursing aid in such situations, decreased the IEMG of the patients while they were able to relax for a while after that. Compared with the control group, the touch group showed a significant decrease in the IEMG during endoscopic insertion and operation. This indicates that touch can relieve patient's strain due to endoscopic insertion. Moreover, this effect of touch was not transient. Touch was always effective in relieving patient's strain whenever muscular strain increased during the endoscopic examination.

It has been reported that patient's fear and anxiety can be reduced by prior information about the operation and the sensations to be felt. The reduced stress condition of the patients, which is revealed by a small increase in their blood pressure and pulse rate, consequently decreases the time required for inserting the endoscopy[2].

Similarly, touch was reported to stabilize a patient's mental state during surgery and decrease blood pressure and pulse rates[3]. However, there is no study using electromyograms as a physiological index of the degree of patient's strain. Using electromyograms reflecting the state of muscular strain, this

study shows that touch can immediately and repeatedly relax patients. Thus the present results support the previous finding that handholding calms down people under stress, relieves anxiety, and increases security[4-7].

As medical technology progresses, upper gastrointestinal endoscopy becomes more frequently used along with various kinds of examinations. When a medical examination is performed in a dark room or a patient is blindfolded, mental stress of the patient becomes extremely large because examination procedures cannot be seen. Thus, smooth examinations depend on how to relax the patients and to help them feel secure. Nurses play an important role in relieving patient's strain induced through medical activities. Experienced nurses can recognize patient's strain from actions of the patient, such as clenching fists, furrowing the brows, and moving the feet.

In this study, patient's strain noted by an experienced nurse, accorded with the increased muscular discharge of the patients. This also supports the view that experienced nurses can detect the presence of patient's strain. On the other hand, inexperienced nurses tend to miss such signs of patient's strain. Thus the education for these inexperienced nurses should be made based on some reliable method. In this respect, the electromyogram monitoring used here is useful for the education in the nursing care such as touch, which can be applied to relieving patient's strain during medical examination.

Touch, combined with prior information to a patient about the procedures and sensations to be felt, is expected to make medical care more efficient. In the near future, having personal contact with patients, including touch, handholding, rubbing, patting, and hugging will become more important in clinical practice.

Conclusion

The effects of a comforting touch by a nurse for relieving patient strain during upper gastrointestinal endoscopy was examined using an elecromyogram in 27 subjects aged from 23 to 75 years. A comforting touch decreased the integrated surface electromyogram of patients during endoscopic insertion and operation. Information about the operation explained before the examination, together with touch, reduces patient's emotional reaction during an upper gastrointestinal endoscopy and is useful for a smooth examination.

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