Differences in the Assessment of Postoperative Pain When Evaluated by Patients and Doctors

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This study was undertaken to compare the assessment of pain intensity by 59 patients and by their doctors according to a visual analogue scale (VAS) at rest and when coughing at 5 and 20 hr after major abdominal surgery. The rating given by the patients, who received epidural analgesia to relieve postoperative pain, was significantly above, and moreover, significantly correlated with that given by the doctors at any time or under any condition of the assessment. However, the correlation between the ratings given by patients and doctors at rest at 5 hr after surgery was low ($r=0.39$, $r_s=0.38$) and significantly different from that when coughing at 20 hr after the operation ($r=0.79$, $r_s=0.80$). Our findings indicate that the assessment of postoperative pain may be associated with some unreliability, especially during early periods, when using the subjective or objective-rated VAS at rest separately, and thus requires the combined use or the concomitant use of the VAS when coughing. Substitutional use of the objective-rated VAS for the subjective-rated VAS is not advised. (Key words: PAIN – postoperative, PAIN MEASUREMENT – visual analogue scale, ANESTHETIC TECHNIQUES – epidural)

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The visual analogue scale (VAS) is considered one of the most reliable and sensitive pain rating methods currently available[1–3], and thus it is widely used in the assessment of postoperative pain both in clinical practice and in research[4,5]. Patients have been usually asked to indicate the severity of pain on the scale. However, since it requires good visual and motor co-ordination, the positioning of a discrete mark on the scale may be difficult for patients who are just recovering from anesthesia and feel very drowsy, or for patients under sedative and analgesic medication. In these situations, therefore, an evaluation made by the medical staff according to the behavior or expression of patients, that is the objective-rated VAS, might be a suitable alternative. A recent study by Forrest et al.[6] has shown, however, that there is considerable difference between the ratings given by patients and by doctors when assessing acute

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abdominal pain.

The present study was therefore conducted to compare estimates made with a VAS by doctors and patients of pain experienced by patients following major abdominal surgery, and to determine whether the time elapsed after surgery and the condition of the patients at the time of the assessment – at rest or when coughing – affect those estimates.

Materials and Methods

Subjects

Over a 6-month period, patients who met all the following criteria were considered eligible for entry into the study: (1) ASA physical status I or II; (2) age between 21 and 75 years; (3) no contraindication to the insertion of an epidural catheter; (4) scheduled for abdominal surgery; (5) no medical history of organic brain damage, mental retardation or other significant psychological disturbances. The study protocol was approved by our institution's human research review committee and informed consent was obtained from each patient.

Procedure

On the day before surgery, the standardized preoperative interview was performed by an anesthetist, and each patient was then given training in the use of the VAS. Premedication comprised 25–50 mg of hydroxyzine and 0.3–0.5 mg of atropine given intramuscularly 1 hr before the patient was taken to the operating room, where an epidural catheter (Portex) was inserted at the level where the middle dermatome was crossed by the surgical incision. The epidural space was identified by the hanging drop technique. Intraoperatively, all the patients received intermittent injections of plain lidocaine via the epidural catheter, and 47 patients were also subjected to inhalation anesthesia consisting of nitrous oxide, oxygen (4:2 $l \cdot min^{-1}$) and 0.3–0.7% isoflurane after induction with 4 $mg \cdot kg^{-1}$ of thiamylal and tracheal intubation following 0.2 $mg \cdot kg^{-1}$ vecuronium. After completion of surgical procedures, all the patients were extubated and taken to a postsurgical care unit.

As for postoperative pain treatment, in principle each patient received intermittent epidural injections of a combination of 4–6 ml of 0.25% or 0.5% bupivacaine and 1–3 mg morphine, at intervals of 8 hr, starting immediately after surgery and until the third postoperative day. Additional treatment for pain such as a bolus epidural injection of 0.25% bupivacaine and an indomethacin suppository was given upon request.

At 5 and 20 hr postoperatively each patient was asked to indicate the intensity of pain, at rest and then when coughing, on a 10 cm-long visual analogue scale, on which the end-points were "no pain" and "worst pain imaginable." Within a few minutes a similar estimate was made by the doctor who had taken the case history and examined the patient. He/she had no access to the patient's score. In this way a pair of simultaneous but independent estimates was made of the pain intensity. Five doctors participated, but each patient was assessed by the doctor in charge of the case.

Statistical Analysis

The statistical analysis was carried out both by parametric and nonparametric methods, since a question has been raised as to whether the VAS may be an interval scale[7], which is considered to be a prerequistie for the use of parametric methods. Pairwise comparisons were undertaken by use of Student's t-test or Wilcoxon's rank sum test. Pearson's product moment correlation coefficient (r) or Spearman's rank correlation co-

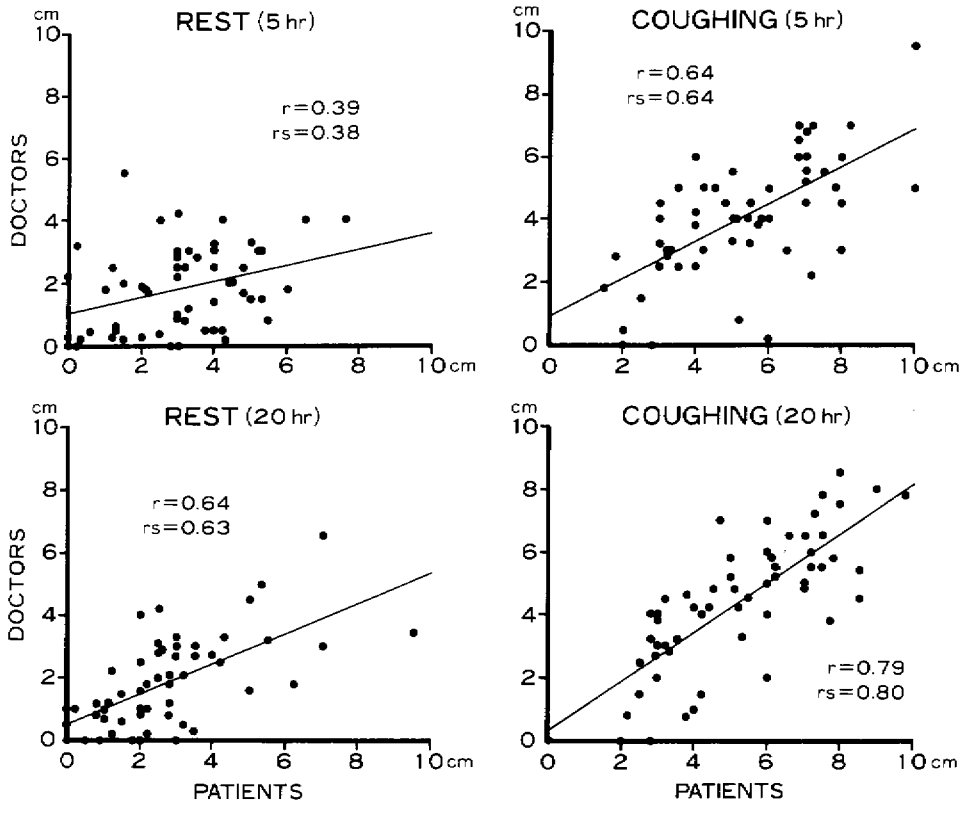

Fig. 1. Relationship between the VAS assessments made by the patients and the doctors at rest and when coughing at 5 and 20 hr postoperatively. r = Pearson's product moment correlation coefficient. r_s = Spearman's rank correlation coefficient.

Table 1. Operative procedures

Procedure	Number
Gastrectomy	18
Hysterectomy	18
Biliary procedures	10
Rectal amputation	4
Hepatectomy	3
Hemicolectomy	2
Jejunal resection	2
Cystectomy and ileal conduit	1
Reconstruction of abdominal aorta	1

efficient (r_s) was calculated to determine the relationship between the ratings given by the patients and by the doctors. One-way analysis of variance (ANOVA) or Kruskal-Wallis test was performed to determine the statistical significance among the differences between the pairs of estimates. When using parametric statistics, the measures of locations are given as means and their dispersions as standard deviations (SD); the medians and the inter-quartile range are used as the corresponding measures for variables used in the non-parametric tests. $P < 0.05$ was considered statistically significant.

Results

Fifty-nine patients were enrolled in the study. There were 25 males and 34 females. Their ages ranged from 36 to 74 years with a mean age of 58, and body weights from 34 to 73 kg with a mean weight of 54.7. The

Table 2. Patients' and doctors' assessment of pain

	Patients (cm)	Doctors (cm)	Difference* (cm)
5 hr:			
at Rest	2.9 ± 1.9	1.7 ± 1.5†	1.2 ± 1.9
	(3.5, 2.5)	(2.2, 2.1)‡	(1.6, 2.4)
when Coughing	5.2 ± 2.0	4.0 ± 1.9†	1.1 ± 1.7
	(5.5, 3.4)	(4.5, 2.3)‡	(1.4, 2.0)
20 hr:			
at Rest	2.6 ± 1.9	1.8 ± 1.5†	0.8 ± 1.5
	(2.9, 1.8)	(2.1, 2.1)‡	(0.9, 1.7)
when Coughing	5.2 ± 2.1	4.4 ± 2.7†	0.8 ± 1.4
	(5.7, 3.5)	(5.0, 2.5)‡	(1.0, 2.1)

Values are mean ± SD and (median, inter-quartile range).

*Difference between the ratings given by the patients and by the doctors. There were no significant differences among the four "Differences" either by ANOVA or by Kruskal-Wallis test.

†$P < 0.01$ when compared with the patients' rating by Student's t-test.

‡$P < 0.01$ when compared with the patients' rating by Wilcoxon's rank sum test.

operations performed are presented in table 1. All the participants used the scale correctly and none of the patients received any analgesics or sedatives within 3 hr before the assessment of pain.

Figure 1 illustrates scattergrams showing the relationship between the ratings given by the patients and those given by the examining doctors at rest and when coughing at 5 and 20 hr after surgery. There was a significant correlation between the ratings given by them at any time or under any condition when pain was assessed: r=0.39 and r_s=0.38 at rest 5 hr after the operation; r=0.64 and r_s=0.64 when coughing at 5 hr; r=0.64 and r_s=0.63 at rest 20 hr after surgery; r=0.79 and r_s=0.80 when coughing at 20 hr. Among the above, the difference between the correlation at rest 5 hr postoperatively and that when coughing 20 hr was significant.

Table 2 summarizes the patients' and the doctors' assessment of pain, and the difference between the ratings given by them. At any time or under any condition, the rating given by the doctors was significantly below that given by the patients. All the differences between the ratings given by the patients and by the doctors were similar.

Discussion

The results of the present investigation show that there is a considerable tendency for doctors to give lower ratings than patients, when assessing postoperative pain using the VAS. Although there was always a significant correlation between the rating given by doctors and that given by patients, the correlation between the two assessments at rest at 5 hr after surgery was lower than that for the assessment made later, either at rest or when coughing. This may indicate that the earlier the assessment of postoperative pain is performed, the greater become variations in the difference between the ratings given by doctors and by patients. While the differences may be of

clinically little importance, these variations should imply unreliability and incorrectness in the evaluation made by patients, doctors, or both.

There has been very little information so far on the interchangeability of postoperative pain assessment with the VAS by the different judges. Although Forrest et al.[6] and Hodgkins et al.[8] have reported differences between the ratings given by patients and doctors, their studies dealt with patients having acute abdominal pain[6] and undergoing needle aspiration and/or injection of joints[8], respectively. In the present study, we examined the effect of major surgery and anesthesia on pain assessment. Despite many various factors that could affect the postsurgical state of patients and thus the assessment of postoperative pain, the overall findings in this study indicate a similar tendency to those reported in the previous studies. It should be noted, however, that there were differences in the assessment conditions. Contrary to the good correlations between patients and doctors found in the above studies, the correlation at rest at 5 hr after surgery in this study was markedly low. This suggests that the postoperative state probably provides a specific setting for assessing pain and that the objective-rated VAS may not always reflect the subjective-rated VAS.

Most of the patients were still drowsy at 5 hr after surgery, when the first assessment took place, however they appeared fully awake from anesthesia when they were taken out of the operating room. The reliability of the VAS, for which according to Revill et al.[3] the error attributable to visual and motor coordination is almost insignificant (0.08 cm) when assessing conscious subjects, can be questionable when assessing pain early after surgery. General anesthesia alone or use of additional narcotics would further deteriorate its precision. However, in view of the better correlation observed when coughing, such an act which increases pain might have made patients focus their concentration on the pain assessment despite feeling slightly drowsy.

The variability in the evaluation by patients is also likely to be due to psychological states and personality variables. Previous researches have identified several factors which affect experienced discomfort after surgery: level and type of anxiety, amount and type of information about the procedure, and cultural and experimental factors which mediate pain expression[9]. Martinez-Urrutia[10] observed that highly anxious surgery patients reported more pain than less anxious patients, both in the pre- and postoperative periods. Woodrow et al.[11] reported that women and older persons are more sensitive to pain. Furthermore, Carlsson[12] has demonstrated that patients differ considerably in their ability to use the VAS correctly.

Insufficiency in preoperative communication between patients and doctors may lead to the low correlation with inaccurate assessments by doctors. A more detailed preoperative interview, from which the level and type of anxiety affecting the patient becomes clearer, could have enabled doctors to make an assessment more similar to that by the patient. In the present study, however, we just attempted to replicate traditional clinical conditions and only a routine interview was taken preoperatively. On the other hand, the evidence of better correlations seen in the assessments carried out later in time might be explained by the information obtained by the doctors after the operation. While the patients were not informed of the results of each assessment, the doctors naturally knew the results before making the next evaluation. Knowing the previous

recordings might have influenced the assessment of doctors except for those made at rest at 5 hr after surgery. There seemed to be a possibility of bias to some degree.

It is unlikely that the lack of familiarity of the patients with the VAS had contributed to variability or incorrectness in their estimates. This scale has been considered as a very simple one, and it has also been shown that practice cannot be expected to improve the reliability of the estimation of pain intensity with the scale[12]. Furthermore, we gave the patients preoperative training in the use of the VAS.

Pain is a subjective experience and thus has seemed to be best quantified only by the patient himself. Although our data could not locate the cause of the difference and the low correlation between patients and doctors, the subjective-rated VAS at rest appears to involve unreliability to some extent as well as the objective-rated VAS. Our findings raise a question regarding the validity of the data of many previous studies investigating the efficacy of postoperative pain therapy, in which the evaluation has been only based on the subjective-rated VAS at rest. The subjective-rated VAS when coughing or the objective-rated VAS assessed by the doctor in charge of the case should be supplementarily employed. Substitutional use of the objective-rated VAS for the subjective-rated VAS is not advised. Which factors and how those factors influence the assessment of postoperative pain when carrying out a subjective or objective-rated VAS deserve further study.

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