

Intraoperative therapeutic suggestions in day-case surgery: are there benefits for postoperative outcome?

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To determine if improved postoperative recovery in surgical inpatients receiving intraoperative therapeutic suggestions are applicable in an outpatient population, 70 consenting, unpremedicated adults undergoing elective outpatient hernia repair under general anaesthesia were allocated randomly to either a therapeutic tape (TT) or a comparison tape (CT) group. A standardized general anaesthetic technique was used with propofol, fentanyl or alfentanil, isoflurane and nitrous oxide in oxygen. Pain, and nausea and vomiting were assessed after operation at 30, 60 and 90 min and at 2, 6 and 24 h. The presence of other side effects, such as headache and muscular discomfort, in addition to recall of tape contents, were also evaluated after operation. Absorption ability was measured before operation. The groups were similar in patient characteristics, preoperative, surgical and anaesthetic characteristics, and level of absorption. There were no differences in pain ratings or need for analgesics administered at any time after operation. Nausea/vomiting was experienced significantly fewer times by patients in group TT compared with group CT over the first 90 min (group CT 15%, group TT 4%; $P<0.02$), but not over the last three assessment times (group CT 10%, group TT 14%; $P<0.25$). The therapeutic tape group experienced fewer side effects over the entire postoperative assessment period ($P=0.03$), in particular less headaches ($P=0.03$) and less muscular discomfort ($P<0.02$). Use of intraoperative therapeutic suggestions could present mildly significant postoperative benefits in outpatients.

Br J Anaesth 1999; **82**: 861–6

Keywords: memory; anaesthesia, depth; anaesthesia, day-case; psychological responses, unconscious perception

Accepted for publication: January 20, 1999

The search for improved and cost-effective means of enhancing patient outcome in day-case surgery has led to evaluation of the effectiveness of non-pharmacological interventions in improving patient recovery. Studies evaluating intraoperative therapeutic suggestions under general anaesthesia have been conducted in non-ambulatory settings. Day-case patients undergoing relatively less invasive operations requiring a shorter duration of anaesthesia have not been evaluated for efficacy of therapeutic suggestions.

An increasing body of evidence suggests that awareness^{1,2} and learning^{3,4} occur during general anaesthesia. Studies have differentiated 'implicit' memory (change in postoperative behaviour without direct recollection of an intraoperative statement or event)⁵ from 'explicit' memory⁶ (such as recalling negative remarks said about the patient in the operating room).⁵ Not surprisingly, consciousness and recall during general anaesthesia have negative medical and legal consequences.^{1,7,8}

A positive and significant clinical application of such learning, however, may be the intraoperative opportunity to deliver suggestions to patients regarding their anticipated postoperative course of events. There are implications for patient well-being and reduced hospital costs (such as decreased complications or shorter duration of stay). Studies have found that patients can respond favourably to taped intraoperative therapeutic suggestions and exhibit a positive postoperative outcome such as a reduction in: duration of stay^{9–13}; pain medication requirements^{14–16}; nausea and vomiting¹⁷; and pyrexia.⁹ A prolonged time before administration of the first analgesic,¹⁸ better recovery based on nursing assessment⁹ and better perception of well being¹⁹ have also been demonstrated. However, other studies have found no significant effect of intraoperative therapeutic suggestions on the course of postoperative recovery.^{20–25} Millar²⁶ ascribed differences in results to methodological difficulties such as small sample size, chance bias and lack

of objective definition of the anaesthetic state. Others have indicated that multiple measures of recovery have been used without adequate statistical controls.²⁷ Study differences in therapeutic suggestion content and surgical procedure may also explain the variance in findings.

Accordingly, we hypothesized that the efficacy of intraoperative therapeutic suggestions would be enhanced in outpatients undergoing less invasive surgical procedures where surgical trauma would be less.²⁸ The effect of patient susceptibility to therapeutic suggestions has been evaluated in previous intraoperative therapeutic suggestion studies.^{12 16 18} Patients who are highly susceptible to hypnosis may have a greater ability to derive positive psychophysiological effects from suggestions.²⁹ The objective of this study was to evaluate the effectiveness of therapeutic suggestions administered during general anaesthesia on patient outcome after day-case surgery, using a sufficiently large sample size, and maintaining the anaesthetic technique and surgical procedure clearly defined for all patients.

Patients and methods

After obtaining written informed consent, we studied patients undergoing elective hernia repair under general anaesthesia, aged 18–60 yr, ASA I–II. Patients who had subjective hearing loss, did not have a working telephone or who were receiving psychotropic medication were excluded. Patients were allocated randomly using a random numbers table to either a therapeutic tape group (TT) or a comparison tape group (CT). The therapeutic tape, 7 min in duration, consisted of a female voice giving continual reassurances in a soothing tone regarding the anticipated postoperative course of events, emphasizing a general sense of well-being and relaxation, and minimal anticipated side effects. Among the relaxing suggestions were that the patient would not have difficulty voiding, would require minimal pain medication and would have minimal discomfort such as sore throat, muscle aches and emetic symptoms. The therapeutic tape was based on the transcript of the Evans and Richardson study tape which found positive postoperative effects.⁹ The tape was modified to accommodate the anticipated postoperative course of events for outpatient hernia repair surgery and was worded more positively. The comparison tape (CT), designed to control for the presentation of auditory material, consisted of the same female voice reading in a neutral manner about the history of the hospital for 7 min. (Contents of both tapes are available on request.) Each tape was recorded in a studio and calibrated at the same volume output. Each tape was set on an auto-reverse mode and played continuously from the time when loss of the eyelid reflex occurred until nitrous oxide was discontinued. All audio cassette tape players were set to the same audio settings and were not audible to anyone in the immediate area. Headphones were placed over each patient's external ear and secured with tape before induction of

anaesthesia. The patient, anaesthetist, surgeon and nurses were blinded to the tape contents.

The standardized anaesthetic technique included propofol 1–2 mg kg⁻¹ for induction, and maintenance with propofol 75–200 µg kg⁻¹ min⁻¹ with 67% nitrous oxide in oxygen. When isoflurane was used, it was limited to less than 0.6% inspired, a concentration above which suppression of unconscious learning may occur.³⁰ Benzodiazepines were not used. Tracheal intubation, performed on all patients, was facilitated with succinylcholine 1 mg kg⁻¹, vecuronium 0.1 mg kg⁻¹ or atracurium 0.5 mg kg⁻¹. Succinylcholine was used based on the patient's physical appearance and a potentially difficult airway, and was preceded with tubocurarine 3 mg. During operation, fentanyl up to 5 µg kg⁻¹ was given. Maintenance of neuromuscular block was facilitated with vecuronium 0.01 mg kg⁻¹ (when succinylcholine was given for tracheal intubation) and residual neuromuscular block was antagonized with neostigmine and glycopyrrolate. In the immediate postoperative period, pain was managed with fentanyl 1–2 µg kg⁻¹ and emesis with droperidol 0.625–1.25 mg. Subsequent emesis in the day surgery unit was managed with compazine. Surgical and anaesthetic time, total amount of propofol used, amount of boluses required, use of local anaesthesia wound infiltration by the surgeon and postoperative respiratory variables were recorded, in addition to the time spent in the postoperative day surgery unit and the patient's physical characteristics.

Pain and nausea/vomiting were evaluated using 0–10 verbal rating scales, by the same research nurse, who was blinded to the tape group, before operation and at six times after operation: 30, 60 and 90 min, and 2, 6 and 24 h. All follow-ups at 6 and 24 h were conducted by telephone. Pain and nausea/vomiting were also evaluated by assessing the number of times the patients were symptomatically treated at three times: in the day surgery unit, and at 6 and 24 h after operation (after discharge). The presence of other side effects (muscular discomfort, sore throat, pain at the i.v. site, difficulty voiding, dizziness, cramps, headache, fever and constipation) in addition to recall of the tape contents, were also evaluated in the day surgery unit, and at 6 and 24 h after operation.

To evaluate individual differences in susceptibility to therapeutic suggestions, before operation patients completed the absorption scale of the multidimensional personality questionnaire (MPQ) developed by Tellegan,^{31 32} by responding to 34 true/false statements. The absorption scale has been shown to be a predictor of hypnotic responsiveness.³³

Statistical analyses

Analyses were conducted using SPSS 6.1 for Windows, statistical package (Chicago, IL, USA). Tape group differences based on physical characteristics, preoperative characteristics and surgical/anaesthesia variables were evaluated using independent sample *t* tests (for continuous variables)

Table 1 Patient characteristics in the comparison tape group (CT) and the therapeutic tape group (TT)

	TT group	CT group
Mean age (yr)	40.5	38.9
Sex (% male)	88	75
Education (%)		
Partial high school (<12 yr)	12	6
High school graduate	24	42
Partial college (12–16 yr)	27	11
College graduate	32	28
Graduate degree	6	14
Race (%)		
Black	62	50
White	32	36
Hispanic	6	11
Other	0	3

and chi-square tests (for categorical variables). Analyses of variance with repeated measures were performed on pain scale ratings over the six assessment times by tape group. Because of the relatively low incidence of patients experiencing nausea/vomiting after operation, the non-parametric Cochran's Q test was performed, after transforming all ratings at each time into a dichotomous 0 (a nausea/vomiting rating=0) or 1 (a nausea/vomiting rating greater than 0) response. Chi-square analyses were performed at each time and also over the first 90 min and the last three assessment times to assess group differences. Chi-square analyses were performed to evaluate differences by tape group regarding the percentage of patients experiencing other side effects and receiving medications.

Although studies have shown the potential negative effects of isoflurane on learning,^{30 34 35} others have shown that nitrous oxide can facilitate learning by antagonizing isoflurane-induced suppression of learning.³⁶ Other studies have demonstrated that implicit learning can occur with isoflurane.⁴ In light of this controversy, differences between groups were analysed after removing those patients who received isoflurane. Receiving isoflurane did not impact on the results. These patients were therefore included in all analyses.

Results

Seventy patients completed the study: 34 patients were allocated randomly to the therapeutic tape group (TT) and 36 patients to the comparison tape group (CT). The two tape groups did not differ significantly in physical characteristics, or preoperative, surgical or anaesthetic characteristics (Tables 1–3).

To evaluate the effect of individual susceptibility to therapeutic suggestions, the TT group was divided into two groups based on the group's median score of absorption on the MPQ. There were no significant differences between above median and below median 'absorbers' for any of the physical characteristic, anaesthetic or outcome variables. Accordingly, level of absorption was not considered in any further analyses.

Table 2 Preoperative characteristics in the comparison tape group (CT) and the therapeutic tape group (TT). *Range 0–10 (0=no pain, 10=worst pain). †Range 0–34 (the higher the score the more suggestible the subject)

	TT group	CT group
ASA (I/II)	56%/44%	61%/39%
Mean No. of previous general anaesthetics	1.09	1.22
Mean pain score before surgery*	0.65	0.42
Mean absorption score†	15.8	15.5

Table 3 Surgical operation undertaken and type of anaesthetic used in the comparison tape group (CT) and the therapeutic tape group (TT) (values are given as mean unless otherwise stated). *Patients received a combination of neuromuscular blocking drugs for intubation/maintenance, therefore percentages add up to more than 100%

	TT group	CT group
Hernia surgery type (%)		
Inguinal	88	78
Ventral	3	11
Umbilical	6	11
Other	3	0
Duration of surgery (min)	77.6	75.5
Propofol		
Mean induction (mg)	192	183
Mean maintenance (mg)	643	711
Mean No. of boluses	0.79	0.97
Opioid induction and maintenance		
Alfentanil		
Mean dose (µg)	1339	1193
% Receiving	26%	19%
Fentanyl		
Mean dose (µg)	179	171
% Receiving	74%	81%
Succinylcholine*		
Mean dose (mg)	106	115
% Receiving	50%	31%
Vecuronium*		
Mean dose (mg)	8.0	8.2
% Receiving	76%	86%
Atracurium*		
Mean dose (mg)	40.0	46.0
% Receiving	3%	14%
Other		
Isoflurane (mean %)	0.52	0.52
% Receiving	15%	28%
Oxygen (mean %)	35	35
N ₂ O (mean %)	65	65
Local infiltration with local anaesthetic agent (% receiving)		
Bupivacaine 0.25%	65	61
Bupivacaine 0.5%	9	14
Other	0	3
Not infiltrated	26	22
Nasogastric tube (% receiving)	9	3

Analysis of variance with repeated measures performed on the pain ratings with the independent variables time and tape group showed that pain decreased significantly over time, regardless of group membership ($P=0.00$), but there were no significant group differences ($P=0.89$) or group by time interactions ($P=0.72$) (Fig. 1). In addition, there were no significant differences between groups in the number of times patients were treated for pain or in the type of analgesic administered either at the ambulatory surgery unit or at 6 or 24 h after operation.

Only 27% of all patients experienced nausea/vomiting

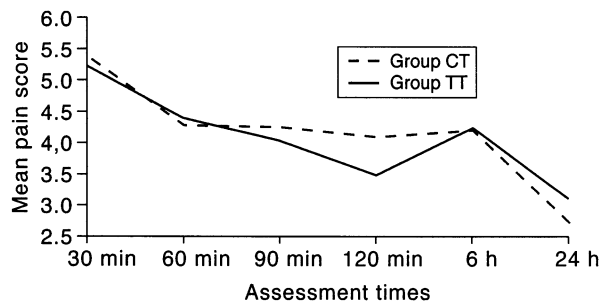


Fig 1 Mean pain scores for patients in the comparison tape group (CT) and the therapeutic tape group (TT) at each assessment time. Pain decreased significantly over time in both groups.

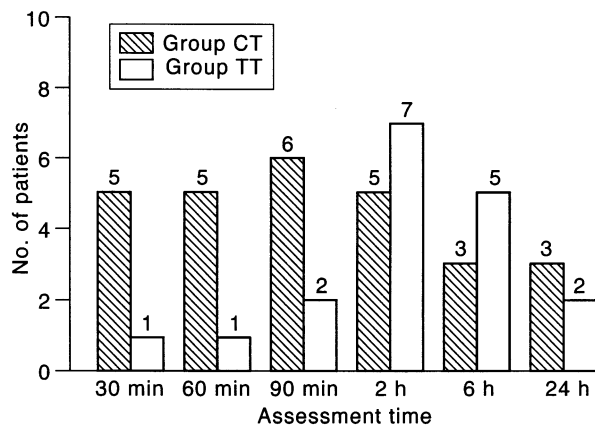


Fig 2 Number of patients in the comparison tape group (CT) and the therapeutic tape group (TT) who experienced nausea/vomiting at each of the assessment times. Nausea/vomiting was experienced significantly fewer times by patients in the TT group compared with the CT group over the first 90 min but not over the last three assessment times.

after operation (TT group 24%; CT group 31%); 7% of all patients received medications for nausea. The non-parametric Cochran's Q test performed separately for each group on the presence or absence of a nausea/vomiting rating greater than 0 over the six assessment times, was significant for the TT group ($P=0.002$), indicating that the presence or absence of nausea/vomiting ratings differed significantly over time. The same finding was not found for the CT group ($P<0.36$). Although between-group chi-square analyses did not reveal any significant differences in the percentage of patients experiencing nausea/vomiting at each time, nausea/vomiting was experienced significantly fewer times by patients in the TT group than in the CT group over the first 90 min (CT group 15%, TT group 4%; $P<0.02$), but not over the last three assessment times (CT group 10%, TT group 14%; $P<0.25$) (Fig. 2).

The TT group experienced fewer side effects (other than pain or nausea/vomiting) than the CT group over the entire postoperative assessment ($P=0.03$), particularly headaches ($P=0.03$) and muscular discomfort ($P<0.02$), although at each specific assessment time (day surgery unit, 6 or 24 h) there were no significant differences between groups in the percentage of patients who experienced side effects or who

Table 4 Other side effects in the comparison tape group (CT) and the therapeutic tape group (TT). *Chi-square=4.70, $P=0.03$; †chi-square=5.80, $P<0.02$

	TT group (n = 34)	CT group (n = 36)
Day surgery unit		
Experienced other side effects (n)	15	21
Received medications for side effects (n)	0	0
6 h postop.		
Experienced other side effects (n)	19	22
Received medications for side effects (n)	0	1
24 h postop.		
Experienced other side effects (n)	17	21
Received medications for side effects (n)	0	5
Most prevalent side effects experienced at any time (n)		
Headache*	1	7
Muscular discomfort†	1	8
Sore throat	17	22
Difficulty voiding	6	7
Dizziness	4	8

received medications for side effects (Table 4). Evaluating the effects of succinylcholine on the occurrence of muscular discomfort showed no significant relationship between receiving succinylcholine and having muscular discomfort after operation.

No patient had conscious recall of the tape contents in the day surgery unit, or at 6 or 24 h after operation.

Discussion

We found that intraoperative delivery of positive suggestions to patients in an ambulatory setting appeared to play a mildly positive role in postoperative outcome with regard to nausea/vomiting and other side effects, despite the lack of explicit memory for the tape contents.

Pain scores decreased over time after operation in a similar manner for both groups. Even previous studies that found positive effects of intraoperative suggestions⁹⁻¹⁹ did not find any change in pain scores, indicating that perhaps they may not be sensitive enough to discriminate group differences. Ghoneim and Block⁸ noted that the dose and timing of preoperative and intraoperative opioids and the need for a large sample size confounded the use of pain as a postoperative measure of group differences. There were also no differences in the number of times patients were treated for pain or in the type of analgesic administered, suggesting that the level of postoperative pain intensity was not influenced by intraoperative suggestions.

More favourable results were obtained for nausea/vomiting. The TT group benefited for the first 90 min after operation, experiencing fewer episodes of nausea/vomiting than the CT group, after which a non-significant increase in occurrence was noted in the TT group. The ratings for nausea/vomiting were low in both groups, making clinically significant findings difficult to obtain. The low incidence of nausea is perhaps attributable to the use of propofol in the anaesthetic technique and the fact that hernia repair is not generally associated with postoperative nausea. Although the tape mentioned nausea/vomiting only

once directly, and once indirectly, it is quite plausible, as McClintock and colleagues¹⁴ suggested, that general positive suggestions of relaxation can reduce symptoms of nausea/vomiting. Clinically, it is well established that symptoms of nausea are responsive to relaxation training.³⁷ Williams, Hind and Sweeney¹⁷ similarly found a positive effect on postoperative nausea, although at 24 h after operation (their only postoperative assessment time).

Similarly, the TT group experienced significantly fewer other side effects than the CT group over the entire postoperative assessment period, benefiting particularly from fewer headaches and less muscular discomfort. Why the incidence of particular side effects such as headaches (which were not directly referred to on the tape) and muscular discomfort were appreciably reduced by the tape but other side effects, such as voiding and sore throat were not affected, is difficult to explain. One can postulate that headaches and muscular discomfort are more sensitive to tension and stress and therefore may be more amenable to the general relaxation effects that were so strongly emphasized on the tape. The overall focus of the tape was one of general relaxation and comfort. The soothing tone may be more beneficial than the actual verbal message.^{8 16 18} Headaches and myofascial pain have been shown to be effectively treated by relaxation and hypnotic techniques³⁸ and are among the most common pain syndromes treated with cognitive-behavioural techniques. Symptoms such as sore throat, voiding and dizziness are less susceptible to these methods. In any case, although not statistically significant, fewer patients in the TT group than in the CT group experienced these symptoms after operation. In addition, 'involuntary' pain conditions, such as headaches and muscular discomfort, may be more susceptible to the effects of hypnosis than self-initiated behaviours, such as swallowing (sore throat) and voiding.³⁹ In addition, the patient's susceptibility to therapeutic suggestions was not related to the efficacy of the tape, a finding supported by others.^{12 16 18}

Lack of recall of tape contents by either group may suggest adequate depth of anaesthesia. The lack of 'explicit' (conscious) memory does not preclude 'implicit' (unconscious) memory. Thus the mildly positive postoperative effects exhibited by the TT group may have resulted from their implicit memory of the tape contents.

More positive results might be obtained with conscious sedation,⁴⁰ a live therapist (instead of a tape) delivering the suggestions,²³ focusing the suggestions on one specific outcome,¹⁷ or delivering them before and during operation.¹² However, others⁴¹ have found no positive effect of being taught preoperative hypnosis on postoperative outcome. Clearly, intraoperative therapeutic suggestions is a complex process that is difficult to evaluate and is in need of additional rigorous studies.

Although recovery after ambulatory surgery has focused on pharmacological interventions to minimize patient discomfort during the perioperative period, these results tentat-

ively suggest a moderate role for non-pharmacological interventions, such as intraoperative therapeutic suggestions, particularly in light of its low cost and non-invasive nature. A mildly favourable postoperative outcome was obtained as a result of the tape, as evidenced by some reduction in side effects, suggesting excellent cost and risk benefit ratios for this intervention (although economic analyses were not conducted). With nausea and vomiting still representing significant postoperative side effects, affecting as many as 38% of all patients even after discharge,⁴² use of intraoperative therapeutic suggestions could present significant postoperative benefits.

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