

## Hypnoanesthesia for Endocrine Cervical Surgery: A Statement of Practice

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### ABSTRACT

**Objectives:** To assess the feasibility of endocrine cervical surgery under hypnoanesthesia as a valuable, safe, efficient, and economic alternative to general anesthesia.

**Methods:** Between April 1994 and June 1997, 197 thyroidectomies and 21 cervical explorations for hyperparathyroidism were performed under hypnoanesthesia (HYP) using Erikson's method. Operative data and postoperative course of this initial series were compared to a contemporary population of patients ( $n = 119$ ) clinically similar except that they declined HYP or were judged unsuitable for it, and who were therefore operated on under general anesthesia (GA).

**Results:** The surgeons all reported better operating conditions for cervicotomy using HYP. Conversion from hypnosis to GA was needed in two cases (1%). All patients having HYP reported a pleasant experience and, keeping in mind that the GA group is not a randomly assigned control group, both had significantly less postoperative pain and analgesic use. Hospital stay was also significantly shorter, providing a substantial reduction in the costs of medical care. The postoperative convalescence was significantly improved after HYP and a full return to social or professional activity was significantly quicker.

**Conclusion:** From this study, we conclude that HYP is an effective technique for providing relief of intraoperative and postoperative pain in endocrine cervical surgery. The technique results in high patient satisfaction and better surgical convalescence. This technique can therefore be used in most well-chosen patients and reduces the socioeconomic impact of hospitalization.

### INTRODUCTION

The advance of hypnosis as a scientific endeavor has occurred within the two last centuries. In 1843, Sir John Elliotson, professor of surgery and president of the Royal Medical and Surgical Society in London, made an initial report of surgical procedures realized using "Magnetic Anesthesia" (Elliotson, 1843).

Although Elliotson was severely and publicly criticized, other surgeons adopted the techniques, calling them "mesmerism anesthesia." Parker, in Dublin, reported 200 procedures, including a painless amputation carried out under hypnosis (Hoareau, 1992). Subsequently, in 1852, J. Esdaile a Scottish surgeon published a study describing in detail 315 major operations performed in India with "Mesmerism" as the

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in the HYP and GA group are listed in Tables 1 and 2, respectively. For 2 patients in the HYP group, definitive histology of a cold nodule revealed follicular carcinoma (intraoperative frozen section was negative). These patients had subsequent completion of thyroidectomy under hypnoanesthesia, per their request, several days after the primary operation. In the other cases of thyroid cancer, diagnosis was provided preoperatively by fine-needle aspiration. One of these patients was pregnant and underwent a total thyroidectomy under hypnoanesthesia prior to the 24th week of pregnancy. All of the patients of the GA group were admitted the day prior to surgery. Patients of the HYP group scheduled for surgery in the morning were admitted the day prior to surgery; those scheduled for surgery in the afternoon were admitted in a fasting state on the morning of the operation. In the HYP group, premedication consisted of only 0.5 mg oral alprazolam (Xanax®, Upjohn, Peers, Belgium); in the GA group, all patients were premedicated

with alprazolam 0.5 mg orally 2 hours before surgery. Prior to induction of hypnosedation, intravenous access was established, to allow titrated administration of anxiolytics (midazolam; Dormicum®, Roche, Brussels, Belgium) and analgesics (alfentanil; Rapifen®, Janssen Pharmaceutica, Berchem, Belgium). Doses were titrated throughout surgery in order to maintain conscious sedation, to provide patient comfort, and to facilitate quiet surgical conditions. Noninvasive blood pressure, heart and respiratory rates, and arterial oxygen saturation were monitored and automatically recorded during surgery (Datex® AS/3 monitor, Helsinki, Finland).

*Hypnotic induction*

Hypnosis was induced using an eye fixation procedure and progressive muscle relaxation, as described by Eriksson and others (Erickson, 1966, 1970; Faymonville, 1994, 1997). Hypnosis is a naturally occurring state; the patient "places himself" in this state, the anesthesiolo-

TABLE 1. INDICATIONS FOR SURGERY UNDER HYPNOSIS AND UNDER GENERAL ANESTHESIA

<i>Indications for thyroidectomy and parathyroidectomy under hypnosis in 218 consecutive patients</i>		
<i>Indications for surgery</i>	<i>Number of patients</i>	
Thyroid surgery		
Thyroid solitary cold nodule	81	37.1%
Multinodular goiter	61	28.1%
Solitary toxic adenoma	28	12.8%
Plunging compressive goiter	13	5.9%
Papillary and follicular carcinoma	7	3.2%
Toxic multinodular goiter	5	2.4%
Chronic lymphocytic thyroiditis	2	0.9%
Parathyroid surgery		
Primary hyperparathyroidism	21	9.6%
Total	218	100%
<i>Indications for thyroidectomy and parathyroidectomy under general anesthesia in 119 consecutive patients</i>		
Thyroid surgery		
Thyroid solitary cold nodule	44	36.9%
Multinodular goiter	39	32.7%
Solitary toxic adenoma	8	6.7%
Plunging compressive goiter	11	9.2%
Papillary and follicular carcinoma	4	3.3%
Toxic multinodular goiter	2	1.6%
Chronic lymphocytic thyroiditis	1	0.8%
Parathyroid surgery		
Primary hyperparathyroidism	9	7.5%
Secondary hyperparathyroidism	1	0.8%
Total	119	100%

sole anesthetic (Esdaile, 1846). He showed that the use of Mesmerism anesthesia minimized surgical shock and improved morbidity. At the time, this promising surgical approach was censured, primarily because the medical establishment showed a great deal of hostility. In fact, the discovery of ether in 1846 and chloroform in 1847 all but eliminated interest in the psychological mechanisms of pain control and in the patient's personality as a factor influencing recovery. Nevertheless, many investigators including psychoanalysts, psychiatrists, and neurophysiologists continued to study hypnotic phenomena, finally concluding that it was appropriate to define hypnosis as an altered state of awareness (Hoareau, 1992). It became clear that this state could influence physiologic processes, particularly the functioning of the autonomic nervous system, the release of neuroendocrine hormones, immune function, and the perception of pain (Anderson, 1987; Blacher, 1987; Blankfield, 1991; Hathaway, 1986; Holden-Lund, 1988; Spanos et al., 1984).

Since 1992, we have routinely used hypnosis in more than 1300 procedures in plastic surgery (Faymonville et al., 1994, 1997). Our clinical success and experience with this technique, combined with the current propensity toward minimally invasive surgery and with the widespread desire for a more "holistic" doctor-patient relationship, led us to investigate whether hypnosis using active patient collaboration could be used as an effective adjunct to conscious intravenous sedation ("hypnosedation") for endocrine surgery, as an alternative to general anesthesia, with the hypothesis that such an approach would reduce the physiologic and psychologic responses to a surgical stress.

## PATIENTS AND METHODS

### *Patients*

Since 1992, hypnosis has been used as adjunct therapy in conscious sedation (hypnosedation) for plastic surgery at Sart Tilman University Hospital in Liège, Belgium. After the successful experience of more than 1000 procedures under hypnoanesthesia, we decided in

early 1994 to apply hypnosedation in endocrine cervical surgery (Faymonville, 1995, 1994, 1997; Meurisse et al., 1996).

Three hundred and thirty-nine (339) patients seen at our endocrine surgery clinic for thyroid and parathyroid diseases between April 1994 and June 1997 were given information concerning hypnosis and conscious intravenous sedation, and were asked to consider this option as an alternative to general anesthesia. Deafness, severe psychiatric diseases, and allergies to local anesthetics were considered as exclusion criteria for the procedure. Informed consent was the first requirement for inclusion. Patients averse to seeing or hearing any aspects of the operating room experience were automatically excluded. Two hundred eighteen patients (218) agreed to hypnoanesthesia (HYP group) and were interviewed, examined, and informed by the anesthesiologist in charge of the project (M.E.F. and J.J.). Of those patients unsuitable or unwilling for this method, 35.6% preferred general anesthesia (GA group,  $n = 119$ ). No preoperative testing of hypnotic susceptibility was done.

Despite the fact that in the present retrospective study, there was nonrandom assignment of the patients, we wanted to compare the intraoperative and postoperative courses of the HYP group with those of the 119 remaining patients who had surgery under general anesthesia for thyroid and parathyroid diseases during the same time period (GA group). In that way, the GA group was described as a comparative group of classic and historic procedure and not a randomly assigned control group. No significant differences were found between both groups in terms of demographic data (gender and age), diagnostic indications for thyroid or parathyroid surgery, hormonal status, or types of surgical procedures.

The HYP group included 197 thyroidectomies (153 females, mean [ $\pm$ SD] age:  $45 \pm 13.2$  and 44 males, mean age:  $42 \pm 12.4$ ) and 21 parathyroidectomies (16 females, mean age:  $63.7 \pm 16.7$ ) and 5 males, mean age:  $55.7 \pm 20.2$ ). The GA group included 109 thyroidectomies (84 females,  $47 \text{ years} \pm 11$  and 25 males,  $50 \text{ years} \pm 9$ ) and 10 parathyroidectomies (8 females,  $60 \text{ years} \pm 9$  and 2 males,  $49 \text{ years} \pm 8$ ). Indications for surgery and surgical procedures

of an equal amount of prilocaine 1% with adrenaline (1:200,000) (Citanest Adrenaline® Astra, S.A., Brussels, Belgium) and bupivacaine 0.5% (Marcaine® Astra, S.A.). The cranial skin-platysma flap was dissected rostrally to the notch of the thyroid cartilage and maintained by stay sutures. The flap was dissected caudally to the suprasternal notch.

A classic thyroidectomy was then performed, without cutting the strap muscles. In cases of lobectomy or total thyroidectomy, systematic visualization of the superior laryngeal nerve and dissection of the recurrent nerve and the parathyroid glands were performed. During cervicotomy for primary hyperparathyroidism, all four glands were explored in a bilateral dissection. Except for the use of local anesthetic, this is essentially the same technique as routinely used for thyroidectomy and parathyroid exploration under general anesthesia. During the procedure under hypnosis, the patient was reminded to mention any discomfort using a prearranged signal (wink, grimace). When required, the operative site was reinfused using the same mixture of local anesthetics. In both groups, no drains were left in place at the end of the procedure. All the patients of both groups were operated on by the same surgeons (M.M., T.D., and E.H.) while hypnosis was conducted by the same anaesthesiologists (M.E.F. and J.J.). In the GA group, anesthesia was induced with Propofol® (diprivan, Zeneca, Destebergen, Belgium): 2 mg/kg and Sufentanil® (Sufenta, Janssen) 20 µg. After tracheal intubation facilitated by cisatracurium® 0.2 mg/kg, general anesthesia was maintained with isoflurane® and 50% nitrous oxide in oxygen. During surgery, all patients received an intravenous infusion of Hartman's solution (5 mL/kg/h).

#### *Postoperative phase*

As with general anesthesia, in the HYP group, postoperative analgesics consisted of 2 g of intravenous propacetamol, (a precursor of paracetamol [Pro-Dafalgan®, Upsamedica: 2 g propacetamol = 1 g paracetamol (paracetamol = acetaminophen in the United States)]) and 40 mg intramuscular of tenoxi-

cam (Tilcotil®, Roche S.A.). After a stay (60 minutes for the HYP group and 180 minutes for the GA group) in the postanesthesia care unit, the patients were transferred to the ward, where 500 mg paracetamol plus 30 mg codeine sulfate (Dafalgan® Codeine, Upsamedica) was given orally at the patient's request every 6 hours.

In the HYP group, the patient was allowed to ambulate immediately. Oral intake was also permitted. The HYP patient was discharged from the hospital on the morning after surgery, which allowed for several hours surveillance of the surgical site for the development of a hematoma. Patients in the GA group were discharged 48 to 72 hours after surgery. In both groups, prior to discharge, flexible fiberoptic laryngoscopy and measurement of serum calcium were carried out. Patients in both groups had follow-up visits at the outpatient clinic on day 10 and 30 after surgery, during which the surgical wound was examined and a general evaluation was carried out.

#### *Method of evaluation*

For all patients in both groups, the following parameters were recorded: the duration of the surgical procedure; the weight and size of the specimen; the estimation of blood loss by weighing sponges; the incidence and nature of complications, and the duration of hospital stay. In the HYP group, the requirements for local anesthesia and intravenous sedation were also recorded. Postoperative pain and patient satisfaction were assessed using a 10-cm visual analogue scale (VAS) (0 = no pain at all; 10 = intractable pain) (Ansseau, 1984; Bond et al., 1974). Surgical conditions were also rated by the surgeons on a same VAS scale (0 = poor conditions; 10 = excellent conditions regarding patient positioning and immobility, muscle relaxation, bleeding, incidence of coughing). On day 10 of the postoperative period, the patient's muscular strength was measured using a dynamometer and was compared to the preoperative value (Palmer et al., 1987). Analgesic consumption was recorded for the first postoperative day. Time before full return to social or professional activity was noted on day 10 and 30. Additional data were obtained by phone when needed.

TABLE 2. SURGICAL PROCEDURES UNDER HYPNOSIS AND UNDER GENERAL ANESTHESIA

<i>Surgical procedures in 218 consecutive patients operated on under hypnosis for thyroid and parathyroid diseases</i>		
<i>Surgical procedures</i>	<i>Number of patients</i>	
Thyroid surgery		
Nodular excision	10	4.6%
Isthmectomy	10	4.6%
Complete lobectomy	142	65.1%
Total thyroidectomy	33	15.1%
Completion of thyroidectomy for secondary diagnosis of cancer	2	0.9%
Parathyroid surgery		
Adenomectomy	18	8.3%
Subtotal parathyroidectomy	3	1.4%
	Total	218
		100%
<i>Surgical procedures in 119 consecutive patients operated on under general anesthesia for thyroid and parathyroid diseases.</i>		
Thyroid surgery		
Nodular excision		
Isthmectomy		
Complete lobectomy	74	62%
Total thyroidectomy	34	28.5%
Completion of thyroidectomy for secondary diagnosis of cancer	1	0.8%
Parathyroid surgery		
Adenomectomy	9	7.5%
Subtotal parathyroidectomy	1	0.8%
	Total	119
		100%

gist creates conditions that allow the patient to access this specific state. The patient is invited to focus his or her attention on a single, freely chosen perception with positive connotations. This helps both in detachment from reality and with concentration of the patient's inner world. A moderate degree of sensory isolation was necessary to accomplish this, which was provided in part by reducing the activity level in the operating room, eliminating unnecessary conversation, and reducing the volume levels of equipment-related alarms. While pursuing this inner fixation, the patient entered a hypnotic trance, which is defined as an altered state of awareness wherein he is able to accept and comply with subconscious suggestions. The anesthesiologist continually gave permissive and indirect suggestions of well-being to maintain the hypnotic process and enhance the creativity of the subconscious mind. The exact words and details of the induction technique and specific suggestions during the course of

induction varied depending on the anesthesiologist's observations of patient behavior, and on their judgement of the patient's needs. A monotonous voice was used, with intentional use of repetitive metaphoric language. With the onset of the hypnotic state, immobility (catalepsy), intense personal well-being, and increased pain thresholds are noted. At the end of the operation, the anesthesiologist (using a normal speaking voice) invites the patient to reestablish contact with the outside world. This serves to restore a fully conscious state within several seconds.

#### *Surgical procedure*

In the HYP group, when the patient was considered at an adequate trance level ( $\pm 10$  minutes) with slow eye movements, his head was gently hyperextended. The line of a 5- to 6-cm symmetric collar incision, in a natural skin crease, was infiltrated with a fixed combination

TABLE 4. COMPARATIVE POSTOPERATIVE DATA OF PATIENTS OPERATED ON FOR THYROID AND PARATHYROID DISEASES UNDER HYPOSEDATION ( $n = 218$ ) AND GENERAL ANESTHESIA ( $n = 119$ ).

	Groups		p value
	Hypnoseidation ( $n = 218$ )	General anesthesia ( $n = 119$ )	
Pain on day 1 (VAS, cm)	1.8 $\pm$ 1.7	3 $\pm$ 1.5	<0.001
Paracetamol consumption on day 1 (mg)	792 $\pm$ 598	1306 $\pm$ 530	<0.001
Muscular force (% preoperative values)	95.2 $\pm$ 0.5	89.9 $\pm$ 0.4	<0.001
Patient satisfaction (VAS, cm)	9.3 $\pm$ 1.3	6.7 $\pm$ 1.8	<0.001
Hospital stay (hours)	44 $\pm$ 15	74 $\pm$ 8	<0.001
Postoperative fatigue on day 10 (VAS, cm)	1.7 $\pm$ 2.0	4.06 $\pm$ 1.9	<0.001
Return to normal activity (days)	12 $\pm$ 10	33 $\pm$ 9	<0.001

VAS, visual analogue scale.

tion during surgery. After a brief stay in the postanesthesia care unit, resolution was complete. Fiberoptic laryngoscopy confirmed normal vocal cord mobility at that time. Complications observed in the GA group consisted essentially of transient hypoparathyroidism in two cases and of transient recurrent laryngeal nerve palsy in one case.

#### Comparative postoperative data

The comparative postoperative data of patients who underwent surgery for thyroid and parathyroid diseases under hypnoanesthesia or general anesthesia are listed in Table 4. Once again, one could argue that because of the non-randomized nature of the comparative group of patients, the HYP group was a more compliant group and that this group would, therefore, require less analgesia and return to work earlier. However, some trends are striking. The mean hospital stay and the postoperative pain and analgesic consumption were significantly lower in the HYP group. All patients having hypnoanesthesia reported altered time perception during surgery, which most estimated as lasting approximately 15 to 30 minutes. All had subjectively pleasant experiences, involving recollection of past events, and none regretted choosing this technique. Those who had had prior general anesthetics all felt that HYP provided superior comfort. Patient satisfaction also scored highly when expressed on a 10-cm VAS on which 0 represents the worst evaluation and 10 the best. Except for two patients who converted to GA, 215 of the 216 remain-

ing patients would request the same management again, if necessary. Two patients did, in fact, have repeat hypnoanesthesia for completion of a thyroidectomy (definitive histology on a cold nodule having revealed follicular carcinoma after operative frozen section was negative) shortly thereafter.

#### Surgical conditions

Evaluation of operative conditions by the surgeons using the VAS revealed higher satisfaction in the HYP group than the GA group (Table 4). Patient position was identical in the two groups, however, infiltration of the site with adrenaline-containing local anesthetic possibly reduced bleeding. During the hypnotic trance, the degree of muscle relaxation was similar to that seen with use of muscle relaxants. Traction on the muscles did not appear to cause discomfort, and the heart rate remained stable even during potentially painful maneuvers. With onset of the hypnotic state, patients appeared immobile, relaxed, with slow roving eye movements intermingled with ocular saccades, while respiratory and heart rate decrease was frequently observed. The patient remained conscious, felt listless but experienced an intense subjective well-being. These changes allow surgery to proceed easily. It was also useful to be able to speak with the patient during some difficult dissections of the recurrent laryngeal nerves. Instances of sudden coughing or movement were exceptional. On the contrary, catalepsy and detachment were apparently so intense that the patient needed

### Statistical evaluation

Statistical calculations were performed using the SPSS for Windows, release 7.0 software package. Results are expressed as mean  $\pm$  SD. Student's *t* test or Mann-Whitney tests were used for continuous data, and the  $\chi^2$  test was applied for categorical variables. When the number of observations was small Fischer's exact test for  $2 \times 2$  tables as used. Results were considered to be statistically significant at the 5% critical level ( $p < 0.05$ ).

## RESULTS

### Intraoperative conversion from hypnosedation to general anesthesia: operative data

Only 2 (1%) of the 218 patients who underwent surgery under hypnosedation required intraoperative conversion to GA caused by positional discomfort related to neck hyperextension in one patient, and lack of complete pain relief in the other. In the remaining patients, all thyroid procedures were completed as initially planned with a mean similar operative time in the two groups (Table 3). In addition, no significant differences were noted between the two groups regarding the mean weights of the specimens and operative bleeding, assessed by the weight of the sponges (Table 3). All patients suffering from primary hyperparathyroidism were cured either by adenectomy (21 cases) or by subtotal parathyroidectomies for multiglandular hyperplasia (3 cases).

In the HYP group, the mean dose of local anesthetic was  $41.8 \pm 11$  mL, of which 30 mL were injected along the incision and into the plane of the strap muscles for raising the subplatysmal flap. Subsequent injections were used, if required, for discomfort. This was occasionally necessary for dissection of the superior pole, while locating the superior laryngeal nerve, and during the section of the isthmus (traction on the trachea). In the same HYP group, the use of intravenous medication was minimal ( $2.9 \pm 1.2$  mg of midazolam and  $550.3 \pm 227.6$   $\mu$ g of alfentanil). All patients remained conscious and in contact with the anesthesiologist throughout surgery.

### Morbidity and mortality

There were no deaths in our series. In terms of morbidity, the overall incidence of complications was 2.75% in the HYP group versus 2.5% in the GA group (not significant [NS]) (Table 3). Under hypnosedation, one permanent unilateral recurrent laryngeal nerve paralysis was noted after total thyroidectomy for follicular carcinoma. One neck reexploration under general anesthesia was required for severe hematoma after one case of total thyroidectomy initially carried out under hypnosis. One case of transient hypoparathyroidism was also observed after total thyroidectomy for toxic multinodular goiter. Four patients presented with transient recurrent laryngeal nerve palsy and/or Horner's syndrome, due to the proximity of injection of local anesthetic solu-

TABLE 3. COMPARATIVE OPERATIVE DATA OF PATIENTS OPERATED ON FOR THYROID AND PARATHYROID DISEASES UNDER HYPNOSEDATION ( $n = 218$ ) AND GENERAL ANESTHESIA ( $n = 119$ ).

	Groups		p value
	Hypnosedation ( $n = 218$ )	General anesthesia ( $n = 119$ )	
Operative time (min)	$66 \pm 22$	$64 \pm 12$	NS
Operative bleeding (g)	$65.7 \pm 26.2$	$68.6 \pm 30.2$	NS
Specimen weight (g)	$30.9 \pm 28.2$	$31.5 \pm 20.6$	NS
Permanent recurrent nerve palsy (%)	0.5	0	NS
Transient recurrent nerve palsy (%)	1.8	0.8	NS
Transient hypoparathyroidism (%)	0.5	1.6	NS
Life-threatening hemorrhage (%)	0.5	0	NS

NS, not significant.

dose midazolam permitted curative surgery in all cases. Nevertheless, in comparison to this technique, hypnoanesthesia has the advantages of avoiding the complications associated with regional anesthesia (intra-arterial injection, phrenic nerve infiltration) and providing a well-demonstrated reduction in perioperative pain and anxiety (Faymonville, 1997). A prospective, randomized study that we conducted during plastic surgery procedures and published elsewhere clearly demonstrated this superiority of hypnoanesthesia over nonhypnotic local anesthesia with intravenous sedation (Faymonville, 1997). Vital signs are significantly stabilized during hypnoanesthesia, even with reduced doses of alfentanil and midazolam. Hypnoanesthesia thus maximizes patient satisfaction and surgical conditions.

Our current retrospective study demonstrates the feasibility of performing major endocrine surgery using hypnoanesthesia. We did not assess hypnotizability and outcome, but assumed, as did Barber (Barber, 1980) that all patients were responsive to hypnosis if properly approached. Intraoperative conversion to general anesthesia was only necessary in two cases (1%). No major morbidity was seen in either group. Surgery under hypnosis did not require longer surgical times than general anesthesia and therefore did not disturb the schedule of daily operative programs. On the contrary, at the end of the surgery, reemergence of the patient takes just a few moments, rapidly freeing the operating room for the next case. For the surgeon, a dry operative field allowed an easy dissection. Four factors were probably involved in this observation: (1) the necessity for very gentle manipulation; (2) the use of local anesthetic solutions containing epinephrine; (3) the presence of spontaneous ventilation that avoided periodic increases in intrathoracic pressure with consequent venous hypertension; and (4) the maintenance of improved vasomotor stability during hypnosis (Clawson, 1975; Grabowska, 1971).

The intensity of pain experienced by the patient and analgesic requirements are subjective parameters and are not proportional to the intensity of tissue damage (Beecher, 1956). Psychological influences and prior personal and/or family experiences are very important in the

pain phenomenon. Erikson (1970) insisted that pain is not a simple nociceptive stimulus, but rather a complex construct involving memories of past painful experiences and the current episode, amplified by the perceived possibility of future pain. The hypnotic process, with suggestions of reinterpretation, substitution, distortion, displacement, and even of abolition of pain perception allows the patient (who is deeply focused on reliving a highly pleasant personal experience) to dissociate himself from his or her real, consensus surroundings (Beecher, 1956; Erickson, 1970; Spanos et al., 1984). It is interesting to note that the suggestion of pleasant experiences is more efficacious in producing hypnoanalgesia than the suggestion of perception of a lesser degree of pain (Miller et al., 1986; Price et al., 1987). The patient, with adequate hypnotic guidance, relives a comfortable experience; these sensations of comfort can, in turn, be projected into the present and serve to reorient the interpretation of the nociceptive stimuli associated with the operation, this aspect of hypnosis also serves to potentiate other therapeutic interventions, such as intravenous sedation (Faymonville et al., 1995). During surgery, if pharmacologic analgesia is required, the total dose is reduced in the patient under hypnosis (Faymonville et al., 1997). The doses of midazolam and alfentanil used in our series are minimal. The pain experienced by the patients in the hypnoanesthesia group in the immediate postoperative period and the first 24 hours postoperatively was significantly less than that of patients from the control nonrandomized group having had general anesthesia. Curiously, the hypnoanalgesic effect lasts considerably longer than the operation itself, because decreased analgesic consumption in the hypnoanesthesia group persisted postoperatively.

Despite the fact that, as shown in volunteers, we demonstrated that the hypnotic state is a particular cerebral waking state where the subject, seemingly somnolent, experiences a vivid, multimodal, coherent memory-based mental imagery that invades and fills the subject's consciousness (Maquet et al., 1999), only hypotheses exist to explain the analgesic effect of hypnosis; no psychophysiologic substrate has yet been demonstrated. Potential explanations in-



to be reminded occasionally to swallow, so as to avoid airway obstruction with accumulated secretions.

#### *Professional and social reinsertion*

It is generally assumed by the Belgian Social Security that after conventional thyroid or parathyroid surgery under GA, patients return to work after a 4- to 6-week period of convalescence. Indeed, after general anesthesia, patients often complain of fatigue, decreased vitality, and psychomotor slowing 10 to 12 days postoperatively. Sleep cycles are often disturbed, emotional lability and depression are not uncommon, and concentration and memory are reduced. The "postoperative fatigue syndrome" and surgical convalescence were significantly diminished after hypnoanesthesia (Table 4). The hand-grip test (muscular power) revealed a well-preserved strength in the HYP group (Table 4). Full return to social or professional activities was accomplished significantly earlier in the HYP group (Table 4), although potential selection bias dictates that we be reserved about these results.

### DISCUSSION

Hypnosis in many forms has been reported and practiced for millennia and secondarily promoted at the turn of the 19th century by several authors in the clinical arena. The beneficial effects of hypnosis on patients undergoing major surgery have been previously described in clinically and scientifically relevant literature (Bennet et al., 1986; Blankfield, 1991; Egbert et al., 1964; Faymonville et al., 1997, 1995; Johnston et al., 1993; Leserman et al., 1989; Mumford et al., 1982; Rogers et al., 1986; Surman et al., 1974). However, hypnosis remains included in some complementary medicine techniques that have been slow to gain support among allopathic practitioners. This may be due to its reliance on patient cooperation, a high potential for patient and investigator bias, the lack of appropriate controls, and perceived variation in patient sensitivity. These reasons explain why the medical community has been slow to endorse or use these procedures more regularly.

Nevertheless, while each hypnotic technique has limitations, it is difficult to negate the overall beneficial outcomes that have been widely reported. The details of particular techniques have been extensively reviewed in a statistical meta-analysis of 34 controlled-outcome studies conducted by Mumford (1982). More recent reviews have concluded that preoperative hypnosis can significantly shorten the convalescent period, promote physical recovery, aid the emotional response of patients after surgery, and demonstrate dramatic cost savings (Bennet et al., 1986; Blankfield, 1991; Disbrow et al., 1993; Johnston et al., 1993; Rapkin et al., 1991). Most recent prospective, randomized controlled studies have definitively confirmed that the combination of current medical practices with complementary techniques (i.e., hypnosis) results in both medical and psychological benefits to patients (Asthon et al., 1997; Faymonville et al., 1997).

In our experience hypnosis has been used in the preoperative and postoperative periods, but its greatest value is in intraoperative use as an alternative to general anesthesia (Faymonville et al., 1995, 1994, 1997; Meurisse et al., 1996). Due to excellent results in the use of hypnoanesthesia in plastic surgery (Esdaile, 1846; Faymonville, 1997), and in the current propensity toward minimally invasive surgery, we considered applying the same strategy in cervical endocrine surgery as a possible means of improving the cost/benefit ratio of these procedures that are usually performed under general anaesthesia.

Although thyroid and parathyroid surgery was performed under local anesthesia only prior to 1929 (Fee, 1990), it is clear that currently, general anesthesia remains the primary choice for the vast majority of endocrine surgeons. By contrast, since we began the hypnoanesthesia program in our center, most of patients are systematically asked to consider this option. In our center, requests for the procedure increase yearly, as the confidence of the general population and medical community increases. Another team (Ditkoff, 1996) described a series of patients in whom loco-regional anesthesia and sedation were used successfully during thyroid and parathyroid surgery. A deep bilateral cervical plexus block, combined with local anesthesia and intraoperative low-

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clude modulation of the emotional responses triggered by recognition of nociceptive information according to the meanings assigned to it, activation of various nuclei in the reticular system with analgesic effects, blockade of transmission of nociceptive information between the reticular system, sensory neurons, and cortical associative neurons, and secretion of endorphins (Enqvist, 1991). The high level of patient satisfaction noted in the hypnoanesthesia group is probably related to a considerable elevation of the pain threshold and to a more pleasant subjective experience, particularly when compared to previous surgical hospitalizations. It is also due in part to increased self esteem because of the active, cooperative role played by the patient. It should be noted that "Ericksonian" hypnosis is not directive, which differentiates it from hypersuggestibility. Indirect hypnosis does not rely on execution of suggestions, but rather on accompanying a motivated and consenting patient, and on the patient exerting perceptual effort whose nature depends only on his way of seeing the world (Faymonville et al., 1995). It is one of the reasons explaining why the most important contraindications to hypnoanesthesia include an insufficiently motivated team (surgeon, anesthesiologist, nurses) and patient.

Inconsistencies and contradictions remain when one examines the effect of psychological interventions on physiological and biochemical outcomes of surgery (Kessler et al., 1996). Are catecholamines, which respond to emotional state, involved? Is cortisol secretion potentiated by psychic and physical stresses? Does presurgical anxiety affect immunologic systems? These questions, not yet consistently answered, reveal a vast new field of investigation, with possible contributions from widely varying researchers and clinicians. Psychoneuro/endocrinology should be seen as a highly interdisciplinary field, from which answers concerning the mind-body relation may emerge and help to draw psychology and biology beyond the barriers formed by their respective bodies of knowledge.

In conclusion, from our recent experience with hypnoanesthesia applied to cervical endocrine surgery, we consider that this innovative approach is currently safe, effective, and

probably the most cost-effective procedure for neck exploration. Given the interest and the expertise of the anesthetist, and the willing participation of the patient, this is an excellent tool that may have much wider applications than currently appreciated. There are as yet no complications or drawbacks associated with hypnosis and the advantages are numerous:

- (1) Hypnoanesthesia may be recommended for routine use in all patients, not only for elderly medically compromised patients but also for all of those who are fit for general anesthesia and motivated to experience hypnosis (Kulkarni et al., 1996);
- (2) There is no need for a preoperative determination of a susceptibility to hypnoanesthesia; the only condition required is the patient's agreement and cooperation;
- (3) Major surgical procedures (total thyroidectomy, etc.) can be performed;
- (5) The surgical conditions are considered excellent because only a short operative time is required with minimal blood loss;
- (6) Patient and surgeon satisfaction are very high;
- (7) Hypnoanesthesia provides excellent perioperative pain and anxiety relief with minimal requirements for local anesthesia and intravenous sedation;
- (8) Hypnoanesthesia reduces the incidence of side effects associated with general anesthesia and allows a rapid postoperative recovery;
- (9) The socioeconomic impacts are obvious (short hospital stay, low requirements for analgesics, and no need for expensive anesthetic agents, early full return to activity).

In light of these results, we conclude that hypnoanesthesia can be proposed successfully to a majority of patients scheduled for cervicotomy, regardless of the indication or the exact procedure proposed and the motivation of the patient.

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