Hypnosis and Pain Control

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David Spiegel

Key Points

- Hypnosis is a state of highly focused attention, coupled with dissociation of peripheral awareness and heightened response to suggestion.
- Hypnotizability is a stable trait – most children and about two-thirds of the adult population are hypnotizable. Hypnosis can help people establish control over both acute and chronic pain.
- Hypnosis reduces pain perception in parts of the brain that affect both sensation and suffering.
- Hypnotic analgesia involves sensory transformation via change in perception of the nature of the pain (temperature, etc.) sensory accommodation, inducing physical relaxation rather than fighting the pain.
- Patients can be taught self-hypnosis and learn to manage pain on their own.

Introduction

Hypnosis, begun as a therapeutic discipline in the eighteenth century, was the first Western conception of psychotherapy [1]. It is a powerful analgesic, and there is compelling clinical documentation of its effectiveness as far back as the mid-nineteenth century. The British surgeon James Esdaile reported that 80 % of subjects obtained anesthesia with hypnosis during major surgical procedures such as amputations [2]. Hypnosis has been proven effective in treating pain and anxiety in the medical setting using randomized prospective trial methodology among both adults [3] and children [4]. Hypnosis is a state of highly focused attention coupled with a suspension of peripheral awareness [5, 6]. This ability to attend intensely while reducing awareness of context allows one to alter the associational network linking perception and cognition. The hypnotic narrowing of the focus of attention [7] is analogous to looking through a telephoto lens rather than a wide-angle lens – one is aware of content more than context. This can also facilitate reduced awareness of unwanted stimuli, such as pain, or of problematic cognitions, such as depressive hopelessness, that can amplify pain [5, 8]. Such a mental state enhances openness to input from others – often called suggestibility – and can increase receptivity to therapeutic instruction. Yet despite much clinical and neurobiological evidence, hypnosis is rarely used as an analgesic for adults or children.

D. Spiegel, M.D.
Department of Psychiatry and Behavioral Sciences,
Stanford School of Medicine,
40th Quarry Road, Stanford, CA 94305, USA
e-mail: aspiegel@stanford.edu

Background or History That Makes This Chapter Significant

Pain can be either exacerbated or diminished by the emotional, cognitive, and social environment that surrounds it. As Fig. 78.1 illustrates, pain signals can be modulated from the top down as well as the bottom up. When Melzack and Wall [9, 10] promulgated their "gate control" theory of pain, antedating the discovery of endogenous opiate receptors in the spinal cord and periaqueductal gray, they emphasized bottom-up modulation of pain signals. Yet they had noticed that in Pavlov's original experiments, dogs seemed to habituate to constant pain, implying a top-down pain modulation system as well. Cortical signals can amplify or inhibit pain input. Indeed, pain usually occurs within the context of subjective distress that is associated with a major medical illness or physical trauma. Thus, the "pain experience" represents a combination of both tissue damage and the emotional reaction to it. In fact, the intensity of pain is directly associated with its meaning, as Beecher showed when comparing opiate levels required to control post-injury pain on the Anzio Beachhead (very low levels) and among less seriously injured civilian trauma casualties (high levels) [11]. Those cancer patients who believe the pain represents a worsening of their

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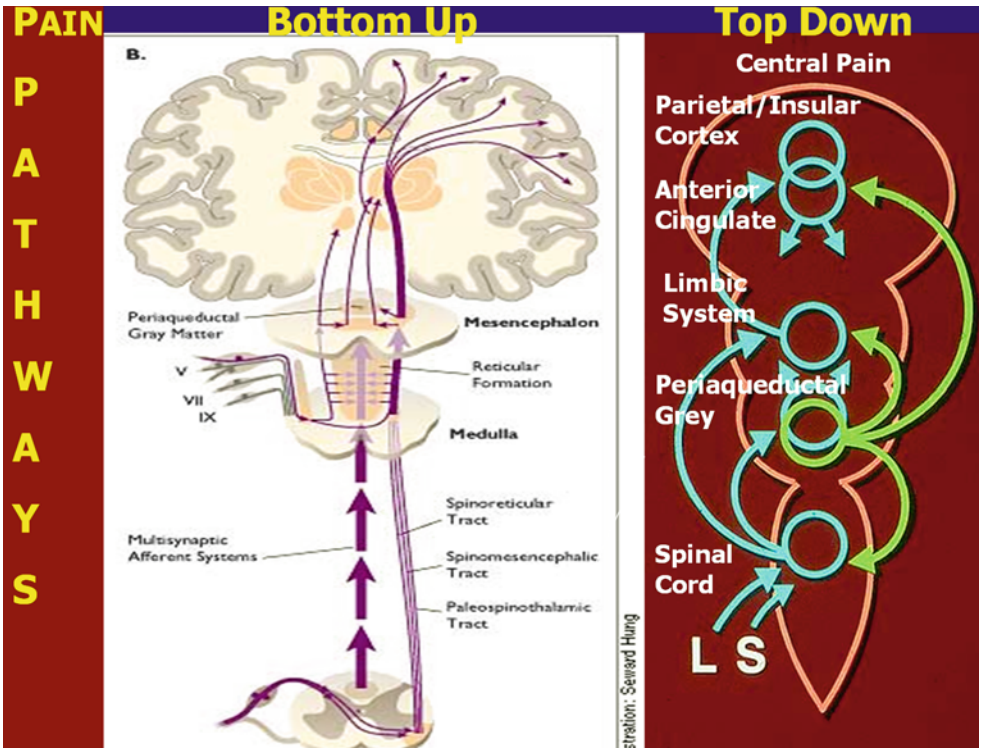


Fig. 78.1 Pain processing

disease experience more pain [12]. Indeed, the meaning of the pain and associated anxiety and depression accounts for more variance in pain than site of metastasis. Pain is often intensified by the helplessness that accompanies it. Many chronic pain patients acknowledge that they could live with their discomfort if they could just keep it within certain boundaries. The combination of pain and its perceived uncontrollability serves to amplify it. The desire for control is a critical component of pain management. Hypnosis provides an excellent opportunity for many to modulate or even eliminate pain.

While there is a common misperception that hypnosis primarily involves relinquishing control and constitutes mindless submission to suggestion, hypnosis is actually a normally occurring state of highly focused attention, with a relative diminution in peripheral awareness [4–6]. Being hypnotized is akin to being so caught up in a good movie, play, or novel that one loses awareness of surroundings and enters the imagined world, a state termed "absorption" [7]. Indeed, people who have such states spontaneously are more likely to be highly hypnotizable on formal testing, indicating that native hypnotic ability is mobilized spontaneously in the service of intense engagement in a variety of activities [8]. Although the suspension of disbelief involved in such absorption may make hypnotized people appear more suggestible, that is, responsive to the instructions of the person inducing hypnosis, in fact all hypnosis is self-hypnosis, a means of focusing attention, whether self-induced or suggested by someone else. Thus, the very state that would appear to engender loss of control can be utilized quite effectively to enhance control, especially over unwanted sensations such as pain, which can be placed at the periphery of awareness, altered, or even eliminated.

Pain is the ultimate psychosomatic phenomenon. It is composed of both a somatic signal that something is wrong with the body and interpretation of the meaning of that signal involving attentional, cognitive, affective, and social factors. Many athletes and soldiers sustain serious injuries in the heat of sport or combat and are unaware of the injury until someone points out bleeding or swelling. On the other hand, others with comparatively minor physical damage report being totally overcome with pain. A single parent with a sarcoma complained of severe unremitting pain as well as concern about her failure to discuss her terminal prognosis with her adolescent son. When an appropriate meeting was arranged to plan for his future and discuss her prognosis with him, the pain resolved [11].

Indeed, anxiety and depression are often associated with pain [13–15]. Depression is the most frequently reported psychiatric diagnosis among chronic pain patients. Reports of depression among chronic pain populations range from 10 to 87 % [16]. Patients with two or more pain conditions have been found to be at elevated risk for major depression, whereas those patients with only one pain condition did not show such an elevated rate of mood disorder in a large sample of health maintenance organization (HMO) patients. The relative severity of the depression observed in chronic pain patients was illustrated by Katon and Sullivan [17] who

showed that 32 % of a sample of 37 pain patients met criteria for major depression and 43 % had a past episode of major depression.

Anxiety is especially common among those with acute pain. Like depression, it may be an appropriate response to serious trauma through injury or illness. Pain may serve a signal function or be part of an anxious preoccupation, as in the case of the woman with the sarcoma cited above. Similarly, anxiety and pain may reinforce one another, producing a snowball effect of escalating and mutually reinforcing central and peripheral symptoms.

Scientific Foundation of This Topic to Pain Care

There is considerable evidence that hypnosis affects clinically important aspects of somatic functioning. The oldest and best established effect is on pain, dating back to the pioneering work of Esdaile [2]. This finding has been replicated in numerous studies [3, 12–15, 18–23]. We conducted a randomized controlled clinical trial among 241 patients undergoing invasive radiological procedures and demonstrated that, compared to either routine care or structured attention, hypnosis produced significant reductions in pain, anxiety, complications, and procedure time while requiring only half of the total analgesic medication (Fig. 78.2a, b) [3].

Hypnosis in combination with group therapeutic support has been proven highly effective in reducing chronic pain as well. In two randomized clinical trials involving women with metastatic breast cancer, this treatment resulted in a significant reduction in pain over a 1-year period while patients were on the same and low amounts of analgesic medication (Fig. 78.3) [16, 24].

Neuroimaging and Hypnosis

Hypnotic analgesia results in reduced amplitude of the somatosensory event-related potential, including early (p100) as well as later (p200 and p300) components [17]. There is evidence from other laboratories that hypnotic analgesia involves both sensory and affective aspects of pain and that changes in the wording of hypnotic instructions alter parts of the brain involved in hypnotic analgesia, from reduced perception (somatosensory cortex) to reduced concern with the pain (anterior cingulate cortex) [25–27]. Many studies have demonstrated that hypnotic alteration of perception changes perceptual processing in the brain. Changing the wording of a pain-directed hypnotic instruction from "you will feel cool, tingling numbness more than pain" to "the pain will not bother you" shifts activation from the somatosensory cortex to the dACC [25, 27]. Similarly, in a PET study, hypnotic suggestion to add or subtract color was shown to alter blood flow in color processing regions of the brain in comparable

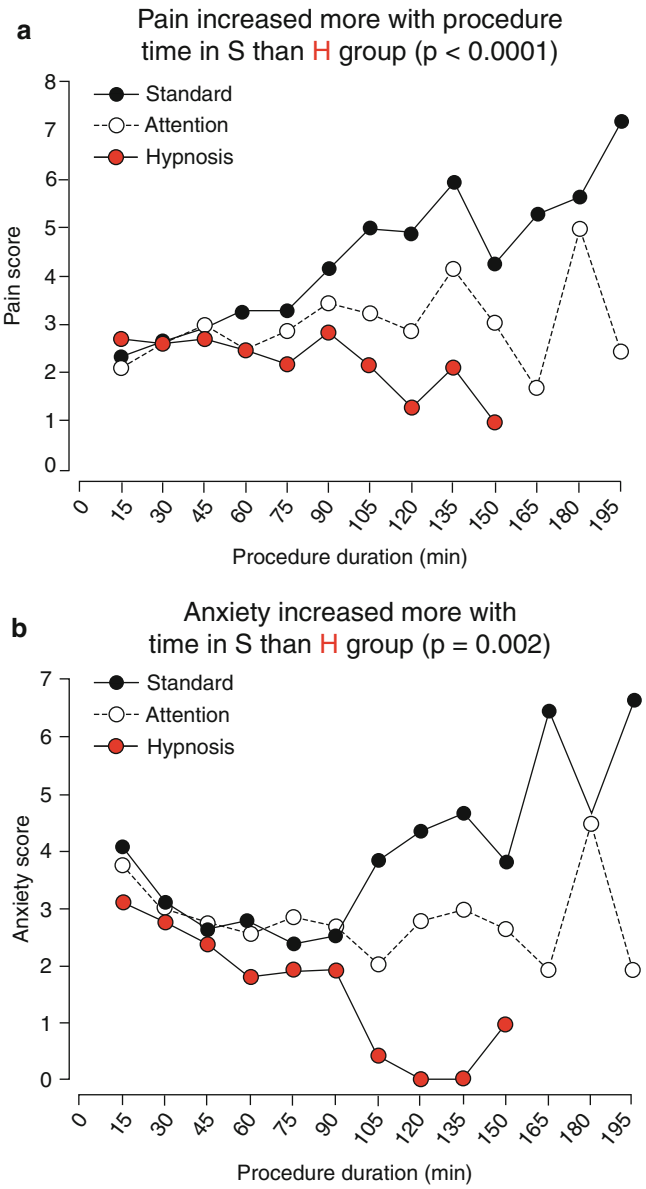


Fig. 78.2 (**a**) Pain increased more with procedure time in S than H group, and (**b**) anxiety increased more with time in S than H group (Adapted from Lang et al. [3])

directions [28]. Hypnotized subjects were asked to see a grayscale pattern in color; under hypnosis, color areas in the ventral visual processing stream were activated, whether they were shown colors or the grayscale stimulus. Believing was seeing. Raij et al. found that DLPFC, dACC, and frontoinsular activation correlated with the degree of pain experienced under hypnotic suggestion [29]. Using PET, Faymonville implicated many regions including the dACC and DLPFC in hypnosis and hypnotic reduction in pain perception [30].

Several studies have tested the idea that endogenous opiates account for hypnotic analgesia. But, with one partial exception [31], studies with both volunteers [32] and patients

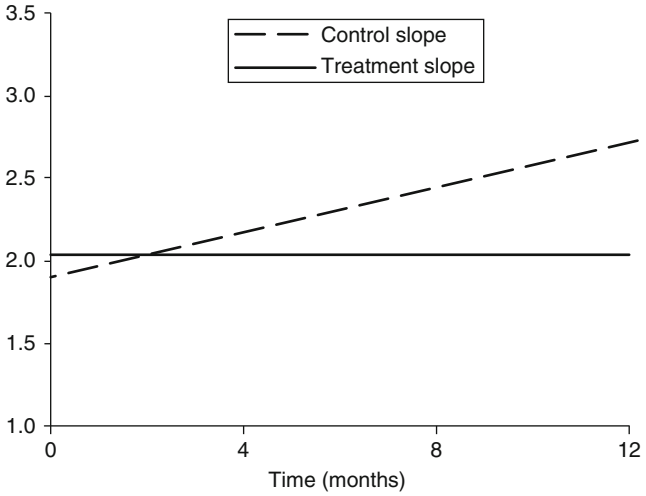


Fig. 78.3 Slopes and mean scores for pain and suffering over the first 12 months and analyzed separately for education only (control) and group therapy plus education (treatment) conditions

in chronic pain [33] have shown that hypnotic analgesia is not blocked and reversed by a substantial dose of naloxone, an opiate receptor blocker, given in double-blind, crossover fashion. Therefore, the cortical attention deployment mechanism is at the moment the most plausible explanation for hypnotic reduction of pain.

Clinical Examples and Usefulness in Clinical Practice

Utilizing Hypnosis

It is wise to commence pain treatment utilizing hypnosis with two types of measurement: of pain and of hypnotizability. Patients can reliably report their pain experience on a 0–10 analog scale, and this provides a benchmark for assessing the subsequent effectiveness of various hypnotic techniques.

The term "hypnotizability" refers to the individual's degree of responsiveness to suggestion during hypnosis [34]. Hypnotizability is a highly stable and measurable trait [5]. In one study, hypnotizability was found to have a 0.7 test-retest correlation over a 25-year interval, making it a more stable trait than IQ over such a long period of time [34]. The trait of hypnotizability is a crucial moderating variable in pain treatment response, both that involving hypnosis directly [35] and in augmenting placebo response [36]. Although not all patients are sufficiently hypnotizable to benefit from these techniques, two out of three adults are at least somewhat hypnotizable [4], and it has been estimated that hypnotic capacity is correlated at a 0.5 level with effectiveness in medical pain reduction [37]. Furthermore, clinically effective hypnotic analgesia is not confined to those with high hypnotizability [25].

One especially useful way of introducing hypnosis into the therapy is through the use of a clinical hypnotizability scale, such as the Hypnotic Induction Profile [5] or the Stanford Hypnotic Clinical Scale [38]. This form of initial hypnotic induction has several advantages:

1. It provides useful information about the patient's degree of hypnotizability. About one in four adults are not hypnotizable, and one in ten is extremely responsive [5]. Patients' performance on a hypnotizability test provides either a tangible demonstration of their hypnotic ability, which is a good starting point for therapy and is often surprising to patients, or it demonstrates that hypnosis is unlikely to be useful, in which case other techniques can be employed. Thus, the hypnotic induction can be turned into a rational deduction about the patient's resources for change [37].
2. The atmosphere of testing enhances the treatment alliance and defuses anxieties about loss of control. The therapist's responsibility is to provide a clinically appropriate setting and give instructions for the systematic exploration of the patient's hypnotic capacity. This is not a power struggle in which the therapist tries to "get the patient into a trance" and the patient succumbs or resists. The therapist is interested in finding out the results of the test, not in proving how successful he or she is at hypnotizing a patient. Thus, the atmosphere becomes something of a Socratic dialogue, in which both discover what the patient already "knows" (hypnotic capacity) but about which there may be little conscious awareness or prior experience. The hypnotic test can be used as a means of providing a sense of physical comfort and safety that is dissociated from the pain experience itself, demonstrating to the patient in a neutral way their ability to alter perception and motor function. It is also useful to teach patients from the beginning to enter the state of hypnosis as a state of self-hypnosis so that they feel in control of the transition to this altered mental state. The instructions can be simple: "All hypnosis is really self-hypnosis." Now that we have demonstrated that you have a good capacity to use hypnosis, let me show you how to use it to work on a problem. While there are many ways to enter a state of self-hypnosis, one simple means is to count from one to three. On "one," do one thing: look up. On "two," do two things: slowly close your eyes, and take a deep breath. On "three," do three things: let the breath out, let your eyes relax but keep them closed, and let your body float. Then, let one hand or the other float up in the air like a balloon, and that will be your signal to yourself and to me that you are ready to concentrate [5]. Once in a state of self-hypnosis, patients can be taught to produce a physical sensation of floating, lightness, or buoyancy. Their sense of physical

comfort can be reinforced by having them initially imagine that they are somewhere safe and comfortable, such as floating in a bath, a lake, a hot tub, or space. This enhances their sense of control over their body.

Hypnotic Analgesia

Hypnosis and similar techniques work through three primary mechanisms: muscle relaxation, perceptual alteration, and cognitive distraction. Pain is often accompanied by reactive muscle tension. Patients frequently splint the part of their body that hurts. Yet, because muscle tension can by itself cause pain in normal tissue and because traction on a painful part of the body can exacerbate pain, techniques that induce greater physical relaxation reduce pain. Therefore, having patients enter a state of hypnosis and concentrate on an image that connotes physical relaxation such as floating or lightness often produces physical relaxation and reduces pain.

The second major component of hypnotic analgesia is perceptual alteration. Patients can be taught to imagine that the affected body part is tingling or numb. Temperature metaphors are often especially useful, which is not surprising since pain and temperature sensations are part of the same neurosensory system, conducted through small poorly myelinated C fibers to the lateral spinothalamic tract in the spinal cord. Thus, imagining that an affected body part is cooler or warmer using an image of dipping it in ice water or warming it in the sun can often help patients transform pain signals. This is especially useful for extremely hypnotizable individuals who can, for example, relive an experience of dental anesthesia and reproduce the drug-induced sensations of numbness in their cheek, which they can then transfer to the painful part of their body. Rather than "fighting" the pain, they can transform it, concentrating on competing sensations. The third approach involves cognitive alteration, changing the context in which pain is experienced or understood. They can also simply "switch off" perception of the pain with surprising effectiveness [27, 28]. Some patients prefer to imagine that the pain is a substance with dimensions that can be moved or can flow out of the body as if it were a viscous liquid. Others like to dissociate, imagining that they can step outside their body to, for example, visit another room in the house. Less hypnotizable individuals often do better with distraction techniques that help them focus on competing sensations in another part of the body.

The effectiveness of the specific technique employed depends upon the degree of hypnotic ability of the subject. For example, while most patients can be taught to develop a comfortable floating sensation on the affected body part, highly hypnotizable individuals may simply imagine a shot of Novocain (procaine hydrochloride) in the affected area, producing a sense of tingling numbness similar to that experienced in dental work. Other patients may prefer to move the pain to another part of their body or to dissociate the affected part from the rest of the body. As an extreme form of hypnotically induced, controlled dissociation, some highly hypnotizable patients may imagine themselves floating above their own body, creating distance between themselves and the painful sensation or experience. To some more moderately hypnotizable patients, it may be easier to focus on a change in temperature, either warmth or coolness. Low hypnotizable subjects often do better with simple distraction, focusing on sensations in another part of their body, such as the delicate sensations in their fingertips.

It is useful to take stock both during and after the hypnotic session regarding pain ratings: "Now with your eyes closed, and remaining in this state of concentration, please describe how your body is feeling." Then ask, "On a scale of 0–10, please rate your level of discomfort right now."

The images or metaphors used for pain control employ certain general principles [1]. Sensory transformation. The first is that the hypnotically controlled image may serve to "filter the hurt out of the pain." They learn to transform the pain experience. They acknowledge that the pain exists, but there is a distinction between the signal itself and the discomfort the signal causes. The hypnotic experience, which they create and control, helps them transform the signal into one that is less uncomfortable. So patients expand their perceptual options by having them change from an experience in which either the pain is there or it is not to an experience in which they see a third option, in which the pain is there but transformed by the presence of such competing sensations as tingling, numbness, warmth, or coolness [2]. Sensory accommodation. Patients are taught not to fight the pain. Fighting pain only enhances it by focusing attention on the pain, enhancing related anxiety and depression, and increasing physical tension that can literally put traction on painful parts of the body and increase the pain signals generated peripherally.

For patients undergoing painful procedures, such as bone marrow aspirations, the main focus is on the hypnotic imagery per se rather than relaxation. This works especially well with children since they are so highly hypnotizable and easily absorbed in images [29, 30]. Patients may be guided through the experience while the procedure is performed, or a given scenario can be suggested, and later the patient can undergo the experience hypnotically while the procedure is under way. This enables them to restructure their experience of what is going on and dissociate themselves psychologically from pain and fear intrinsic to their immediate situation. A large-scale randomized trial compared hypnosis with nonspecific emotional support and routine care during invasive radiological procedures. All patients had access to patient-controlled intravenous analgesic medication consisting of midazolam and fentanyl. The hypnosis condition provided significantly greater analgesia and relief of anxiety, despite patient use of

one-half the medication. Furthermore, with hypnosis, there were fewer procedural complications such as hemodynamic instability; the procedures took on average 18 min less time, and the overall cost was reduced by $348 per procedure [38].

Self-Hypnosis

Hypnotic techniques can easily be taught to patients for self-administration [5, 6]. Pain patients can be taught to enter a state of self-hypnosis in a matter of seconds with some simple induction strategies, such as looking up while slowly closing their eyes, taking a deep breath and then letting the breath out, their eyes relax, and imagining that there is body floating and that one hand is so light it can float up in the air like a balloon. They are then instructed in the pain control exercise, such as coolness or warmth, tingling, or numbness, and taught to bring themselves out by reversing the induction procedure, again looking up, letting the eyes open, and letting the raised hand float back down. Patients can use this exercise every 1–2 h initially and any time they experience an attack of pain [5, 13]. It is useful to provide them with a written summary of the hypnotic induction, analgesic technique employed, and means of exiting the hypnotic state. As with any pain treatment technique, hypnosis is more effective when employed early in the pain cycle, before the pain has become so overwhelming that it impairs concentration. Patients should be encouraged to use this technique early and often because it is simple and effective [34] and has no side effects [35].

Hypnotic Analgesia in Children

Hypnotic techniques are likely to be even more effective among children with pain than adults, since children are more hypnotizable than adults and are thus easily absorbed in images [39, 40]. In using hypnosis with children, some find it helpful to play in an imaginary baseball game and to picture themselves going to another room in the house or watching a favorite TV show. This enables children to restructure their experience of what is occurring and dissociate themselves psychologically from pain and fear of the procedure. This approach utilizes the intense focus in hypnosis to help children dissociate their attention and imagination from their immediate physical surroundings and experiences. It is also helpful to have parents assist and rehearse the procedure so that the children do not encounter anything unfamiliar.

There is evidence that hypnosis can provide anxiety and pain relief to children with medical conditions [41–43], including with cancer [31, 32, 44, 45], cystic fibrosis [33], pain problems [46, 47], pulmonary symptoms [48], abdominal pain [49–56], and postoperative course [57]. Additionally, hypnosis is a noninvasive intervention with minimal risk, which returns control of the experience to the child [58, 59].

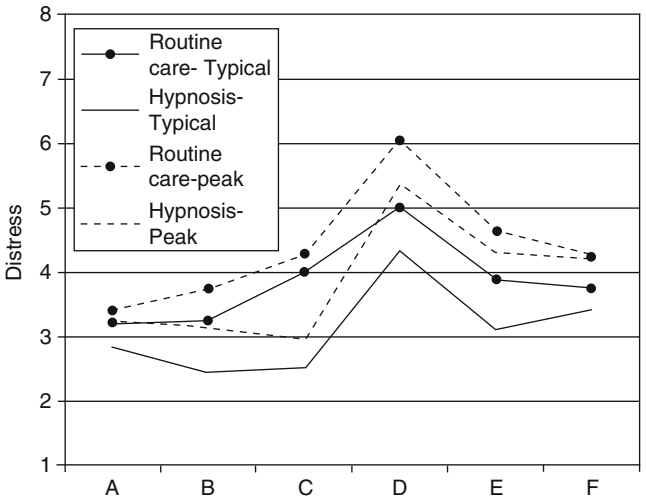
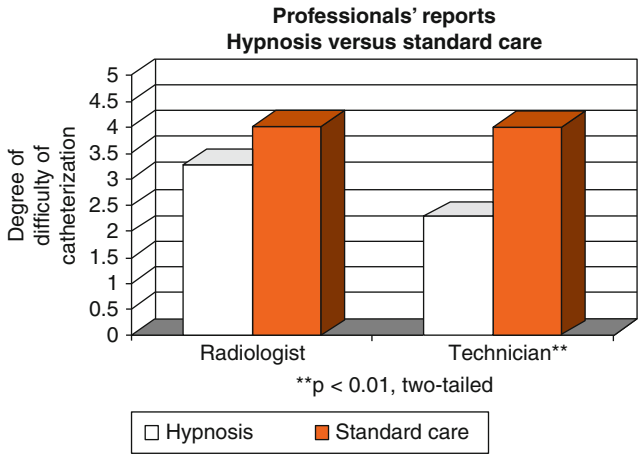


Fig. 78.4 Observer ratings of typical and peak distress levels over phases of the procedure by condition. *A* getting to the table, *B* initial x-ray, *C* catheterization, *D* cleaning and catheterization, *E* bladder infusion and x-rays, *F* voiding and catheter removal

We have considerable experience utilizing hypnosis as an analgesic with children experiencing acute pain. In one randomized clinical trial of the use of hypnosis for children undergoing voiding cystourethrograms, those randomized to the hypnosis condition were given a 1-h training session in self-hypnotic visual imagery by a trained therapist. Parents and children were instructed to practice using the imaginative self-hypnosis procedure several times a day in preparation for the upcoming procedure (Fig. 78.4). The therapist was also present during the procedure to conduct similar exercises with the child. Results indicate significant benefits for the hypnosis group, compared to the routine care group in the following four areas: (1) Parents of children in the hypnosis group, compared to those in the routine care group, reported that the procedure was significantly less traumatic for their children compared to their previous VCUG procedure. (2) Observational ratings of typical distress levels during the procedure were significantly lower for children in the hypnosis condition compared to those in the routine care condition. (3) Medical staff reported a significant difference between groups in the overall difficulty of conducting the procedure, with less difficulty reported for the hypnosis group. (4) Total procedural time was significantly shorter – by almost 14 min – for the hypnosis group compared to the routine care group (Fig. 78.5a, b). Moderate to large effect sizes were obtained on each of these four outcomes [4].

Future Directions for This Topic

Hypnosis is one of the oldest, safest, and most effective analgesic techniques, and there is growing evidence supporting its use [60, 61]. One interesting new direction is coupling



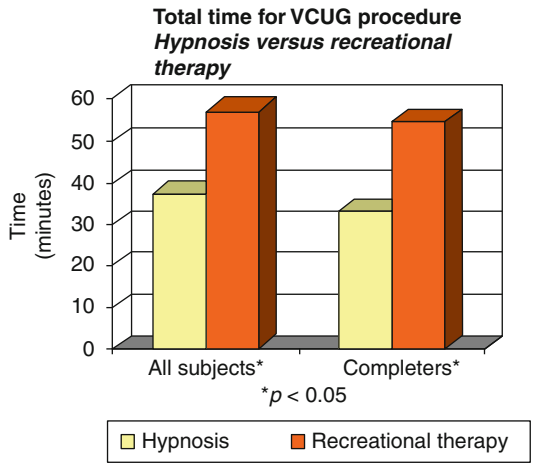


Fig. 78.5 (**a**) Professional's reports: hypnosis versus standard care. (**b**) Total time for VCUG procedure: hypnosis versus recreational therapy

hypnosis with technology that enhances sensory immersion, such as computer-based virtual reality systems [35, 62]. These can enhance analgesic effects and make the most of a given individual's hypnotizability.

Secondly, more can be learned about the neural basis of hypnotic trance and hypnotic analgesia. Knowing specific regions of the brain that are coactivated in hypnosis may help us to better design hypnotic techniques.

Third, application of hypnosis to novel settings can expand and improve its use. Recently, hypnosis has been effectively utilized during breast biopsy [61, 63], and even during lumpectomy for breast cancer [63, 64]. Such techniques have great promise in making medical treatment more effective and humane [6, 65].

Summary

Hypnosis is a safe, effective, and comforting adjunct to the management of both acute and chronic pain. Most individuals are sufficiently hypnotizable to obtain at least some benefit from it, and some will experience substantial relief. It is a means of teaching control over discomfort and can be coupled with other analgesic treatment approaches. Those clinicians utilizing hypnosis for analgesia should have training in this technique along with primary training and licensure in their clinical discipline, be it medicine, dentistry, psychology, or other health-care profession. Referral to a good clinician can be obtained from such professional organizations as the Society for Clinical and Experimental Hypnosis (www.SCEH.US) or the American Society of Clinical Hypnosis (www.ASCH.net). While many types of pain intervention are being developed, it is worth remembering that the strain in pain lies mainly in the brain.

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