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The Mind Prepared: Hypnosis in Surgery

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In 1846, a Scottish surgeon named James Esdaile reported 80% surgical anesthesia using hypnosis as the sole anesthetic for amputations in India. His work caused sufficient stir that when ether anesthesia was demonstrated in what is now called the Ether Dome at the Massachusetts General Hospital on October 16 of that same year, a surgeon strode to the front of the amphitheater and said, "Gentlemen, this is no humbug," to distinguish his surgical team's demonstration from Esdaile's report. It has taken us a century and a half to rediscover the fact that the mind has something to do with pain and can be a powerful tool in controlling it: the strain in pain lies mainly in the brain.

In this issue of the Journal, Montgomery et al. (1) report the results of a randomized trial conducted among 200 patients who underwent excisional breast biopsy or lumpectomy for breast cancer. Patients were assigned to either routine anesthesia plus nondirective empathic listening (the control condition) or a very brief 15-minute presurgery hypnosis session. The hypnosis, which the authors describe in very cursory fashion, consisted of "a relaxation-based induction (including imagery for muscle relaxation), suggestions for pleasant visual imagery, suggestions to experience relaxation and peace, specific symptom-focused suggestions (i.e., to experience reduced pain, nausea, and fatigue), a deepening procedure, and instructions for how patients could use hypnosis on their own following the intervention session." This brief hypnotic preparation was sufficient to produce a statistically significant reduction in the use of propofol and lidocaine; yet despite this, patients in the intervention group reported less pain, nausea, fatigue, discomfort, and emotional upset than did patients in the control group. Doing good also meant doing well, in that the use of hypnosis also resulted in a cost savings of $772.71 per patient, due largely to shorter time in the operating room—an average of 10.6 minutes.

This impressive study builds on the work of Lang and colleagues, who in a series of studies have shown that use of hypnosis during interventional radiologic procedures results in reduced use of anesthetic medication, less pain and anxiety, shorter procedure time (an average of 18 minutes) (2,3), and cost savings of $338 per procedure (4). These results were, surprisingly, independent of age and hypnotizability (5). The ability to be hypnotized is a stable trait that can be reliably measured in 5 minutes or less (6). Children are, in general, more hypnotizable than adults, and there are similar findings of relief of distress among children who are taught self-hypnosis before undergoing voiding cystourethrograms (7). In a study of a similar population to that of Montgomery et al. (1), of women undergoing large core needle biopsy for breast cancer diagnosis, Lang et al. (8) showed that hypnosis statistically significantly reduced anxiety but had a lesser effect on the modest pain associated with the procedure. Thus, the study in this issue contributes to an impressive body of research using randomized prospective methodology in sizeable patient populations to demonstrate that adjunctive hypnosis substantially reduces pain and anxiety during surgical procedures while decreasing medication use, procedure time, and cost. If a drug were to do that, everyone would by now be using it.

So why don't they? For one thing, there is no mediating industry to sell the product—dangling watches are out of fashion for hypnotic inductions. Plus, there is still lingering suspicion that hypnosis reeks of stage show trickery. After all, the magic wand originated with Mesmer's use of a magnetic stick to presumably alter magnetic fields in patients' bodies. Yet hypnosis is the oldest Western form of psychotherapy. Hypnosis is a state of highly focused attention, with a constriction in peripheral awareness and a heightened responsiveness to social cues (5). It is most similar to the everyday state of becoming so absorbed in a good movie or a novel that one enters the imagined world and suspends awareness of the usual one, a condition playwrights refer to as the "suspension of disbelief." This state can exert powerful influence on mind and body. Altering perception using hypnosis results in brain

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changes that literally reduce pain perception [rather than merely altering the response to pain (9–12)]. Indeed, simply changing the wording of the hypnotic instruction from "you will feel cool, tingling numbness more than pain" to "the pain will not bother you" alters the brain location of the analgesia from the somatosensory cortex to the anterior cingulate gyrus (9,13). Hypnotic alteration of color perception results in bidirectional changes in blood flow in the portions of the visual cortex that process color vision—blood flow in this region increases when color is imagined rather than seen and decreases when color is hypnotically drained from a colorful stimulus (14). Thus, there is good neurophysiologic reason to believe that hypnosis is potentially a powerful tool to alter perception of pain and associated anxiety.

You have to pay attention to pain for it to hurt, and it is entirely possible to substantially alter pain perception during surgical procedures by inducing hypnotic relaxation, transforming perception in parts of the body, or directing attention elsewhere. The key concept is that this psychological procedure actually changes pain experience as much as many analgesic medications and far more than placebos (15–17). There is recent evidence from studies of the placebo effect that activity in the anterior cingulate gyrus is linked to that in the periaqueductal gray, a brainstem region that is crucial to pain perception (18). Hypnotic analgesia is real, no less palpable an analgesic than medication, although the pathways are different and do not seem to involve endogenous opiates (19). Rather, hypnosis seems to involve brain activation via dopamine pathways (20–22). Thus, it is not surprising that hypnosis, which mobilizes attention pathways in the brain, can be used effectively to reduce pain perception and attendant anxiety.

Cancer is a disease that hijacks patients' attention. Those coming for diagnostic surgery are understandably anxious about the outcome. They are thus hyperattentive to every pain and its possible implications. The operating room is a novel environment, and humans have evolved to pay special attention to new and potentially threatening situations. Thus, a means of redirecting attention while using the brain to induce physical relaxation rather than promote muscle tension can be especially helpful to cancer patients during their initial surgery. It is now abundantly clear that we can retrain the brain to reduce pain: "float rather than fight." Esdaile would have been proud to read this issue of the Journal. He might even have said, "Ladies and Gentlemen, this is no humbug."

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