TRANCE SURGERY IN BRAZIL

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This report presents the results of fieldwork in Brazil on healer-mediums who perform crude forms of surgery, often employing sharp instruments. We found that these healer-mediums were in a hyper-aroused brain state while they were engaged in behaviors commonly described in the anthropology literature as "possession trance"; therefore, this practice is termed "trance surgery" in this report. The research was conducted at widely scattered sites throughout Brazil. We observed several thousand patients being treated by 9 trance surgeons and videotaped several hundred of these cases. In addition to background information and our own observational material, this paper includes 2 medical case reports, physiological data gathered from healers and patients, and results of a pathologist's examination of a surgically excised tumor. Topographic brain mapping revealed increased brain activity (36-44 Hz) when healer-mediums were engaged in trance behaviors, compared to resting baseline conditions at midline scalp locations (Cz, P < .009 and Pz, P < .004; both matched t tests). These results suggest the presence of a hyperaroused brain state associated with the trance behaviors of the healers. We believe that such a state is required for this unusual practice, but other factors may also be involved. In contrast, a small sample of patients monitored during possession trance surgical procedures revealed no high-frequency brain activity; instead, there were indications of cortical quieting, suggesting relaxation, despite the absence of anesthesia. Pathohistological examination of a tumor excised from a patient in our presence revealed a human fibroadenoma. We conclude that these practices are usually benign and that pain is often absent, despite the lack of sterile procedures and anesthesia. Although during the period of our investigation we were informed anecdotally of 3 cases involving serious complications or death, we personally observed no cases of shock, hemorrhage, or death. The cases presented in this paper, as well as others we have followed, suggest that serious illnesses, not likely to improve without treatment, may do so after trance surgery procedures are performed. If the major benefit of trance surgery is to initiate self-healing processes, it would have to do so in powerful ways, which possibly can be elucidated with positron emission tomography and functional magnetic resonance imaging scans. Positive findings would be helpful in understanding large-scale healing effects and may lead to new treatment protocols. (Altern Ther Health Med. 2000;6(4):39-48)

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The primary purpose of this study was to observe and to document a form of Brazilian alternative medicine and surgery that we have termed "trance surgery" in this paper. We followed up selected cases and collected a tumor excised from a patient's breast; this tumor was submitted to a consultant pathologist for examination. Ancillary to this, we collected physiological data from surgeons and a small sample of patients.

HISTORICAL BACKGROUND

Although the most easily observed alternative surgical practice today involving cutting or piercing the body with sharp instruments is performed in Brazil by a special group of healer-mediums, "nonconventional" surgery has both ancient and extensive cross-cultural roots. The history of surgery reaches back to prehistoric and early historic times. Particularly striking is the practice of trepanation (or trephanation), which refers to the boring into or removal of a piece of the human cranium. This operation has been well documented throughout the world, and specimens of early trepanned human skulls with evidence of significant healing have been found. Trepanation dates back at least to early neolithic times and has been treated in many scientific and scholarly works. (For a review see Brothwell and Sandison.[1])

These practices did not cease with the advent of modern medicine. Margetts,[2] for example, documented contemporary trepanation by the Kisii and Tende tribes in the hills east of Lake Victoria in Kenya, extending into Tanganyika. In this area, trepanation is performed by Western medically untrained "surgeons" without the use of conventional anesthetic or sterile methods. Margetts[2] stated that "both inner and outer tables of the skulls are holed, but not always." Further, Margetts[2] also reported that the mortality was low, perhaps only 5%. The present authors possess a copy of a documentary video made during the 1970s that clearly demonstrates the practice of trepanation by Kisii healers in Kenya.

A European example of apparent impunity to major bodily insult is the case of Mirin Dajo, a Dutchman who died in 1948; he repeatedly demonstrated the ability to impale his own body without serious consequences, on stage and in the laboratory. Upon his eventual death, Mulacz[3] reported that

> [t]he autopsy revealed multiple scars from previous piercing experiments, on his arms and legs, as well as on his chest and abdomen. Numerous internal scars were found due to frequent penetration of the liver, both kidneys, the diaphragm, and the spleen, and also one at the tip of the heart.

This information is derived from the autopsy, which was performed by Brunner and Hardmeier.[4] Another example of immunity from trauma due to significant bodily insult is the case of Jack Schwarz, a Dutch-American self-impaler. This case was documented by Green and Green[5] at the Menninger Clinic in the United States, and by Pelletier and Peper.[6]

Recently, a self-impaling practice in the Middle East called deliberately caused bodily damage (DCBD) has been the subject of several journal articles.[3,7,8] This is a form of spiritual demonstration, rather than a healing practice, performed by a Sufi group known as Tariqa Casnazaniyyah, "the way of the secret that is known to no one." The main center of this group is located in Baghdad, Iraq. Practitioners "cause serious wounds to the human body, yet with complete control over pain, bleeding, and infection, and unusually fast wound healing."[7] According to Hussein et al.,[7] these wounds are usually self-inflicted, but can also be inflicted on other people, with or without their consent, as a demonstration to skeptics that these practices are not faked in some way. The present authors also possess a documentary video of these practices taped by a colleague in 1998.

Mulacz[3] provided a skeptical assessment of these DCBD practices. He accepted the reality of Middle-Eastern piercing practices, but contended that the explanation for these—even tolerance for the impaling of vital organs—lies within the boundaries of ordinary healing capabilities and the scope of present biomedical knowledge. In rebuttal, Dossey[9] addressed Mulacz's reasoning about the medical facts and consequences of impaling in detail, and argued that it is seriously flawed.

There are many other examples of similar practices throughout the world; a recent review of these practices is provided by Hussein et al.[7] Although self-inflicted wounds can be interpreted as a "self-healing" practice involving invoked bodily self-regulation, the same immunity from traumatic consequences, when physical insult is performed on others' bodies, cannot be explained as a self-regulatory process. This "others-healing," when performed on infants and young children, particularly emphasizes this important distinction.[7]

The present authors conclude that the overall evidence indicates that significant physical insults to the body, both in self- and others-healing, can be well tolerated. However, this holds true only under special conditions that at this time are not well understood. The phenomenon of "others-healing" suggests that contemporary biomedical theory may be incomplete.

BRAZIL SURGERY

Trance surgery commenced in Brazil with the medium Zé Arigó in 1950; he died in 1971. Arigó performed surgery and wrote prescriptions, but not in conventional ways; he was not a physician, and what he did was illegal. It has been widely claimed that during the time of his practice, Arigó treated several hundred thousand patients, including the poor as well as the wealthy and powerful, Brazilians and people from all over the world.[10-12,17] Despite public support for Arigó and the reported effectiveness of his work, the Church and the legal authorities reacted negatively.

Born José Pedro de Freitas and raised as a devoted Catholic, Arigó strongly resisted the initial impulses toward becoming a healer-medium. In his early 30s, he began to have disturbing recurrent dreams of blindingly intense lights and a guttural voice speaking a foreign language. These dreams evolved to include vivid operating room scenes and a German physician, Adolph Fritz. Dr Fritz told Arigó that he had been chosen to carry on his medical work, which had been cut short by his death during World War I. Repeated physical and psychiatric examinations of Arigó revealed no underlying pathology. This description of the events leading up to the emergence of the personality of Dr Fritz in Arigó is typical of worldwide reports of spirit possession[13-15]; however, the emergence of instrument-wielding surgical mediums is rare. At this time, such surgical mediums are most prominent in Brazil, where their patients are drawn from a broad spectrum of society, and less prominent in Africa, as mentioned above.

According to the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)*,[16] when a medium exhibiting possession trance is otherwise well functioning, both behaviorally and psychologically, in a culture in which large numbers of people accept the reality of spirit possession, as in Brazil, significant psychological pathology may not necessarily be present.

Since Arigó's death in 1971, it is claimed that the spirit of Dr Fritz has acquired new vehicles for his medical work: mediums who, in trance, are said to be possessed by or to incorporate the spirit of Dr Fritz, just as Arigó did. Some of these mediums were controversial, whereas others were more generally accepted as being true successors.

Among the latter, we observed Edson Cavalcante de Queiroz, MD, Mauricio Magalhães, and Rubens de Faria, Jr. Dr Queiroz was an obstetrician and gynecologist, and maintained a regular medical practice in Recife, Brazil. On certain days of the week, in a healing center he founded for his trance surgery work, he would incorporate Dr Fritz. Dr Queiroz was the only medically trained physician who also performed trance surgery, and when he did so, it was as thoroughly unconventional as the lay healer-mediums.[17]

Rubens de Faria, Jr, a former engineer who has performed trance surgery for 6 years, is currently the major Dr Fritz medium. He was born February 14, 1954, was raised Catholic, and graduated from one of the foremost engineering schools in Brazil. However, according to his mother, when he was very young, several times Rubens reported that he saw the image of a tall, thin, strange-looking being.

In addition to Dr Fritz, there are other surgical spirits. Some are claimed to have been medical doctors, whereas others are saints, such as Ignatius Loyola and Isabel of Portugal. There

are also numerous surgical "helpers" of varied origin. In addition to the trance surgeons incorporating Dr Adolph Fritz mentioned above, we have also observed the following 6 trance surgeons: Antônio de Oliveira Rios/Dr Ricardo, Venancio Sampaio/Dr Arikson Gleiber, Alcino Tavares/Dr Hermann Fritz, João de Abadiania/St. Ignatius Loyola, Dalmo Silva/St. Isabel of Portugal, and Waldemar Coelho/Dr Ludwig. (We use the paired names to indicate each trance surgeon's surgical spirit.)

Although most of these healer-mediums cut or pierce the patient's body, Alcino Tavares/Dr Hermann Fritz and Waldemar Coelho/Dr Ludwig only simulate cutting, employing blunt surgical instruments. This is not done with any intent to defraud. Instead, they consider their effect on the patient to be at the level of the "perispiritual body," which then affects the physical body. The results of the physiological tests during the trance states of these last 2 healer-mediums matched those of the surgeons who actually cut and pierced.

Furthermore, we have observed not only cutting and piercing, but also the use by one healer-medium of toxic substances (a mixture of absolute alcohol, iodine, and paint thinner) injected both intramuscularly and intravenously. We witnessed hundreds of such injections with no apparent negative effect. We also observed closely injections of the toxic mixture into the carotid arteries of a Brazilian medical colleague and an elderly female patient without negative consequences. In addition to the unusual tolerance of such challenges, they also appear to be a vehicle for the healing process (see case 1). Without the aid or consent of the medium, we independently obtained used syringes containing residues of the injected mixture. These syringes smelled strongly of alcohol, iodine, and paint thinner, but analytical testing was not performed due to the field conditions of our investigation.

Also, we witnessed incisions made on parents of small children, acting as surgical surrogates; however, we have no data on the effectiveness of this practice. In summary, these alternative medical practices seem to be much broader in their implications for the understanding of the healing process than just the tolerance of physical insult, either self-inflicted or inflicted upon others.

During Arigó's practice as a trance surgeon, his work was extensively covered in books and the popular media, both in Brazil and internationally.[10-12,18-20] Arigó was studied by several Brazilian professors of medicine, as well as by a group of North-American physicians led by Dr Henry Puharich, an orthopedist and internist. This group collected data during repeated trips to Brazil. Unfortunately, in agreement with Villoldo and Krippner,[17] we conclude that there appear to have been no peer-reviewed articles published on the Arigó phenomenon, possibly because of the difficulty in finding a medical or scientific journal willing to consider such material during the 1950s. However, a popular book about Arigó was published in 1974, in which Puharich's work is described in some detail.[10]

The first trance surgery we personally witnessed for this study was performed by perhaps the most colorful Brazilian trance surgeon in recent years, Antônio Rios, a 37-year-old former laborer whose schooling ended with the first grade. His clinic, on a dusty back street in the small town of Palmelo, Brazil, had a sign proclaiming it to be the clinic of Dr Ricardo, the deceased surgeon incorporated by Antônio when he was in trance.

For 3 hours, we watched Antônio/Dr Ricardo as he worked on 35 patients. Incisions were first made with a scalpel, and many times a circular saw—a dirty carpenter's tool—was used to deepen the incision. Many procedures involved incisions that were superficial; however, many incisions were deep, with 3 penetrating into the peritoneal cavity of the body. In several cases, major blood vessels or nerve tracts were transected. There was no major anesthesia or sterile procedure, and the same tray of instruments was used on all patients. Patients showed no evidence of pain, bleeding was minimal, and no patients went into shock, despite the aggressiveness of many of the procedures. Assistants to Antônio/Dr Ricardo sutured the wounds but did not suture major blood vessels, even though we observed spurting of arterial blood during some procedures. Figure 1 shows photos taken by the research team in the clinic in Palmelo, Brazil, on May 9, 1990.

Within 1 hour, all patients were ambulatory; some patients who had been cut deeply were strolling on the town streets. Although hypnosis would explain some of these effects, we observed no trance induction with any patient, and the first surgical case was an 18-month-old boy with a heart condition, an unlikely candidate for hypnosis.

We contacted 5 patients by telephone 14 months after we observed their surgeries. Of these patients, 4 reported that they were healed and had no infections, inflammations, or other complications. However, they refused to return to their physicians for follow-up examinations. The fifth patient was considered terminal at the time of the surgery and died 1 month later of massive bilateral cancerous brain tumors. Her husband reported that she died painlessly and without other symptoms. However, Antônio/Dr Ricardo chose not to treat this patient for the cancer, but for another condition; the husband reported that condition was resolved following the treatment.

Miguel Vieira, MD, a Brazilian orthopedic surgeon, accompanied us on this particular investigation. He stood next to Antônio/Dr Ricardo during the surgeries and wrote a report (M. Vieira, unpublished data, 1990) validating that the incisions were real and that there appeared to be no negative sequelae (see Results).

A review by Greenfield[21] provides an explanation of Brazilian trance surgery, which the present authors reject (see Discussion), based on spontaneous, self-induced hypnosis and consequent enhanced immune system function. Carvalho[22] has published a case study of trance surgery in Brazil. Villoldo and Krippner[17] also describe the work of Arigó and the trance surgical work of Dr Edson Queiroz.

An in-depth study of safety and clinical efficacy of these extreme practices remains to be performed. However, Greenfield[23] surveyed 32 patients of Mauricio Magalhães (incorporating Dr Adolph Fritz). These patients reported little pain, a lack of complications due to the treatment, and satisfaction with the treatment outcomes.

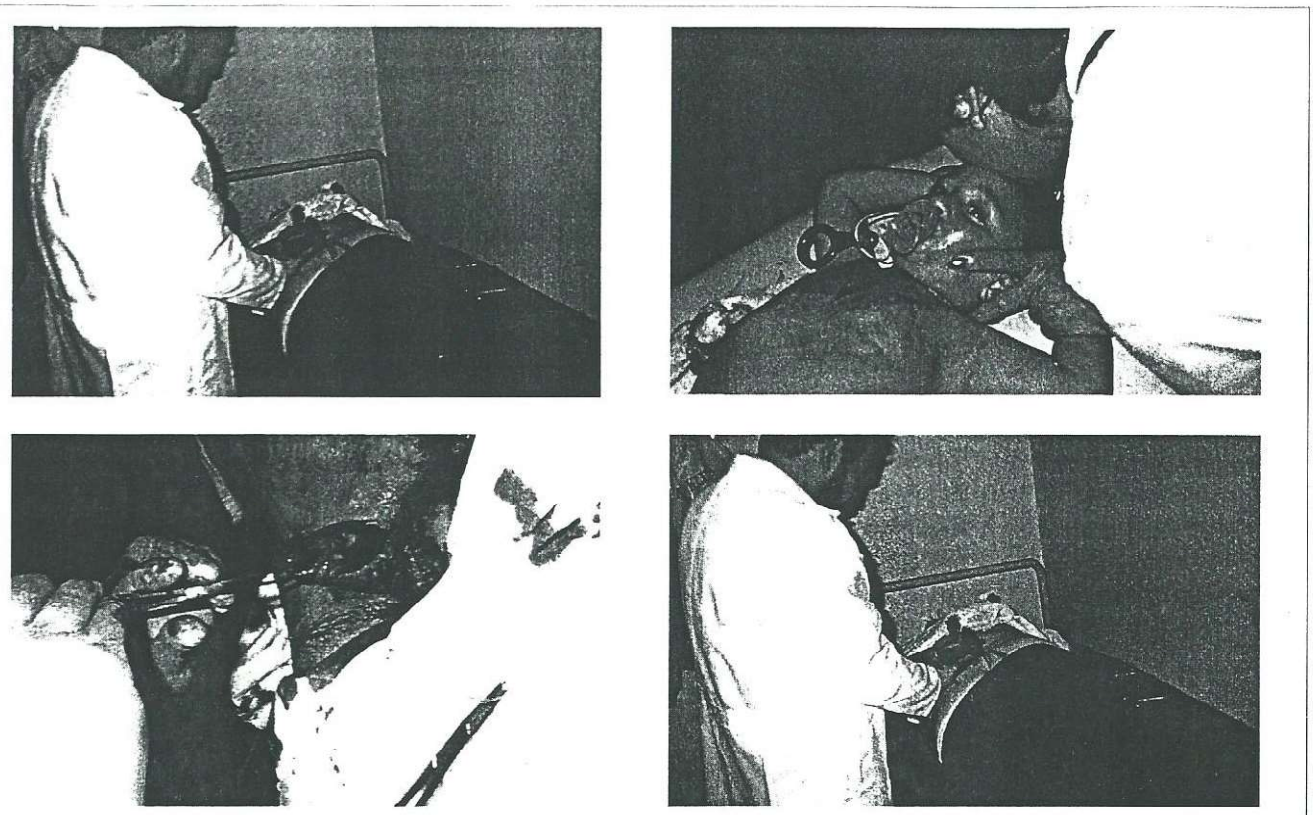

FIGURE 1 Photographs of trance surgery. The patients received no anesthesia; sterile procedures were not employed; bleeding was minimal.

However, the medium—or, according to the trance surgeons, the medium/spirit—influences the patient's body, and the effect on the deep structures of the brain (and through them on the endocrine and other major systems) can be explored with positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) scans. By clarifying which centers of control are involved, a potential new field of research and eventually new clinical methodologies could open up.

METHODS

Nineteen-channel electroencephalograms (EEGs) (International 10-20 System) were recorded from 5 surgeons, while in self-reported trance, and 7 patients during surgery. Both groups were also recorded under resting baseline conditions. A Neurosearch, a 24-topographic brain mapping system, was employed. Electrode application was accomplished with an elasticized electrode cap; electrode impedances were 5000 Ω or less. Data were visually edited, and all epochs containing artifacts such as those due to eye blinks, scalp muscle activity, and bodily movements of the subjects were excluded from further analysis. To distinguish high-frequency (36-44 Hz) brain activity from possible scalp muscle contamination, only data from midline of brain sites Cz and Pz (which do not overlay scalp muscles) were analyzed, and a special statistical procedure controlling for possible muscle contamination was used.

Field observations of trance surgery were recorded with audio and video equipment. A tumor excised in 1 of these field observations was submitted to pathology study.

A sample of patient cases with well-documented medical work-ups before and after trance surgery was selected. The major criterion for inclusion in the sample was the presence of a condition that was unlikely to resolve itself spontaneously. These patients were interviewed by our Brazilian medical consultant, who also reviewed their medical records; then 3 North-American physicians separately evaluated these records. Two of these cases are reported in this paper. It should be noted that (1) trance surgeons do not keep systematic patient records, (2) few of these patients possessed good pre- and posttreatment medical records, and (3) from the small pool of patients with complete records available to us, we made no attempt at random selection to determine whether cases existed strongly suggesting treatment effectiveness.

RESULTS

EEG Results

EEGs of 5 Trance Surgeons. Observable in these data, at widely distributed scalp sites, were intermittent trains of rhythmic, sinusoid-like, high-frequency brain activity. At the 2 electrode sites statistically analyzed, the only significant differences in spectral power between resting baseline and self-reported trance

was for the 36- to 44-Hz frequency band (Cz, t=5.79, df=4, P=.009; Pz, t=4.74, df=4, P=.004) (note 1). This rhythmic activity was intermittent; however, when markedly present, only during the trance condition, the amplitudes at the 2 sites ranged from 8.6 to 12.2 µV (Figure 2).

EEGs of 4 Patients. We also recorded EEGs from 7 patients while they underwent trance surgery. However, due to technical reasons, data from only 4 patients were analyzable. These surgeries all involved piercing the body either with scalpels or surgical scissors, without the use of anesthesia and sterile procedures.

Three of the 4 patients had large amounts of alpha-wave activity during surgery (Figure 3), suggesting a state of relaxation. The patient without alpha-wave activity during surgery also had none during baseline or resting conditions, but gave no indication of pain. The high-frequency activity measured in the surgeons was not found in any patient. These results are consistent with the findings in a case study of a Hawaiian healer and patient in which the EEG and several other physiological measures were recorded.[24] The EEG and somatic physiologic measures of the healer became more aroused during healing, while the patient became more relaxed.[24]

Data from our very small sample of patients are consistent with our extensive observations of trance surgery patients. In most cases, patients appear relaxed and pain-free during these invasive procedures, despite the absence of anesthesia.

Pathology Report

One of the surgeries performed by Antônio/Dr Ricardo during the course of our visit to the clinic was the removal of a breast tumor from a woman in her mid-50s. We videotaped this procedure, which was observed and documented by Dr Vieira, the orthopedic physician on our research team.

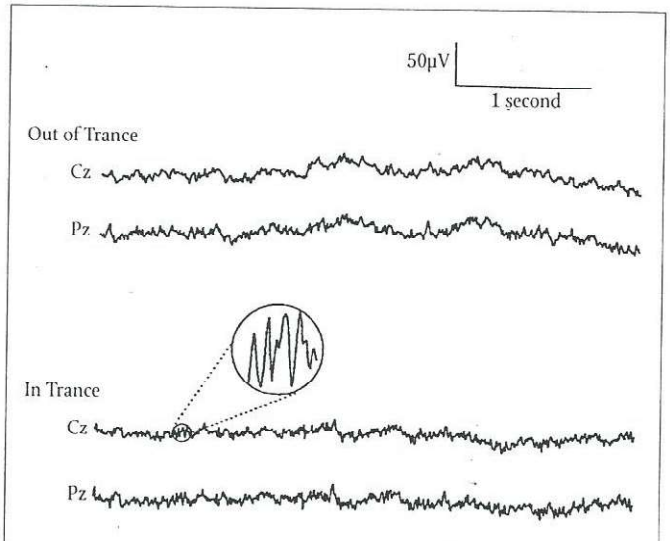

FIGURE 2 Baseline and in-trance EEGs of the trance surgeon, Mauricio Magalhaes. Four seconds of data are displayed, recorded at 30 mm/s. During trance, there are multiple, intermittent bursts of approximately 40 Hz, rhythmic, sinusoid-like activity, at the midline electrodes, Cz and Pz.

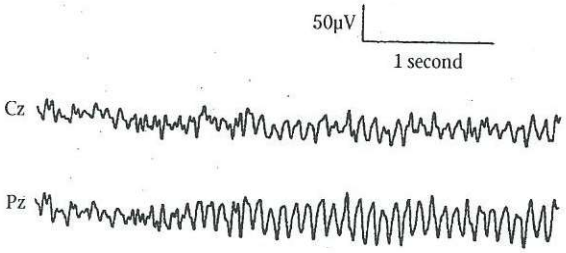

FIGURE 3 EEG of a patient during trance surgery. Four seconds of data are displayed, recorded at 30 mm/s from an unanesthetized patient during trance surgery (surgical scissors had been inserted into his back). Approximately 10 Hz alpha activity is seen, at times exceeding 50 µV in amplitude. This is consistent with the relaxed behavior of the patient.

The tumor was excised from the woman's left breast with the same scalpel Antônio/Dr Ricardo had already used on more than 20 people. The woman showed no signs of pain, and there was little bleeding. Antônio/Dr Ricardo placed the tumor in a small bottle of formalin, and we took it to a pathologist for analysis. The tumor was identified as a human fibroadenoma, a benign tumor.

Field Observations of Trance Surgery

The authors have in their possession a 5-page report by Dr Vieira (M. Vieira, unpublished data, 1990), written in Portuguese with his observations and conclusions regarding the surgeries by Antônio/Dr Ricardo. This report states that real incisions were made, and that in some cases tissue was removed. Dr Vieira listed 11 categories of surgery that he observed, 6 informational points on patients and patient management, and 9 final remarks about the procedures and consequences of the surgeries. Furthermore, he described the operating room behavior of Antônio/Dr Ricardo, the surgical implements used, and some details of the surgical procedures themselves. There are also sections on the spiritual "sterilization" and "anesthetization" and remarks on hemostasis, his examination of some patients returned for a 30-day postsurgical follow-up, and other relevant points. Dr Vieira's report supports the observational material we have described above.

During trance surgery, the entranced medium's body is purportedly used by a possessing spirit or intelligent entity as a vehicle for its own medical purposes. Healing skills supposedly unknown to the healer-medium were manifested during trance behaviors. Trance inductions were not performed, though surgical patients (including infants) appear to be in a state of relaxation.

Anesthesia and sterile procedures were not used in trance surgery; wounds may or may not be sutured. Furthermore, trance surgeons will often deliberately contaminate open wounds and their instruments; for example, by placing scalpels

on the floor and stepping on them. This is done to demonstrate their control over infectious processes.

Our field observations have revealed no postoperative infections. Accounts of infection and inflammation are rare, despite the fact that trance surgery is done under extremely nonsterile conditions. However, some anecdotal reports of complications exist. We must emphasize that we made no attempt to conduct a formal, postoperative study of a large number of patients (however, see the patient survey by Greenfield,[23] cited above).

Patients generally appear to experience little or no pain and minimal bleeding. They usually walk out of the clinic shortly after their operations, often claiming later to have been healed.

Allopathic medicines were sometimes prescribed, but in uncommon combinations. Some of these medicines are obsolete and some contemporary. Herbal remedies may also be prescribed.

The surgery is usually performed quickly, in brightly lit surroundings (in contrast to much traditional trance mediumship), sometimes in the presence of television cameras. Many surgeries involve a seemingly nonspecific incision made in the general locus of the problem. Trance surgeons usually perform no rituals; they work with their eyes open, conversing with those present.

Two Medical Case Studies

Case 1. In December 1995, SA, a retired, 78-year-old railway worker living in Rio de Janeiro, had an episode of intense left-sided chest pain, which worsened with minimal exertion. He also had dyspnea, tachypnea, and elevated blood pressure. He denied sore throat or cough with hemoptysis. He was hospitalized in Rio de Janeiro. On December 14, 1995, the patient was administered an echocardiogram. There was a dissecting aneurysm in the ascending aorta, plus stiffness in the left ventricle. Mitral function was decreased, the aorta was calcified, and the pulmonary and tricuspid showed no alterations. The pericardium appeared normal. Global systolic function and segmental functions of the left ventricle were normal; diastolic dysfunction was seen.

The patient was being treated with captopril, propranolol, and nifedipine for hypertension. Otherwise, he had no medical illnesses. SA had had the usual childhood diseases. He had had 4 surgical procedures, including a right inguinal hernia repair in 1967, a left inguinal hernia repair in 1983, prostate surgery for benign prostatic hypertrophy in 1985, and a cataract removal from the left eye in 1995.

Prior to the diagnosis of aortic aneurysm, the patient had begun weekly treatment with Rubens/Dr Fritz for his other symptoms, beginning in June 1995, with 1 interruption at the end of 1995, until March 1997. During consultations, Rubens/Dr Fritz injected his alcohol-iodine-turpentine mixture behind the left ear and into the left and right inguinal regions.

On January 11, 1996, angiography and aortography were conducted. The ventriculography showed a competent mitral valve and normal left ventricular contractility. There was normal ascending, descending, and abdominal aortography. The coronary circulation (right and left) was normal. Left ventricular and aortic pressures were normal. In summary, the angiogram was entirely within normal limits. At the time of this interview, March 1997, the patient was healthy.

Case 2. In April 1995, LG, a 58-year-old woman living in São Paulo, had a hysterectomy, which was complicated by a postsurgical infection and a resulting lymphocele, which was found to be compressing the right kidney and ureter. During LG's 4-day stay at the hospital, the diagnosis was made with ultrasonography, excreting urography, and computerized tomography.

LG had had 5 prior operations, all cesarian sections in the 1950s and 1960s. These resulted in the delivery of healthy newborns, and there were no reported postoperative complications.

The initial management of the lymphocele (April 1995) was conservative, with a fine needle aspiration to drain it. The lymphocele again became enlarged and infected in August 1995, at which time a drain was inserted; this remained in place for 5 weeks. The patient continued to experience fever, dysuria, polyuria, and urinary urgency, and was advised to undergo surgical removal of the infected lymphocele. Because of her reluctance to have surgery, she consulted 8 specialists between August and December 1995, all of whom advised her that the operation was necessary. Testing at that point showed fibrosis of the lymphocele, and it was felt that surgical intervention was required to preserve function of the right kidney.

Two pelvic ultrasonographies (abdominal and transvaginal) were performed. The first was made on December 11, 1995. A cystic mass (4.7 x 4.2 x 2.6 cm) was present in the right adnexal topography; it had an elongated formation, regular outline, heterogeneous density, and was septated. Discrete homolateral hydroureter and hydronephrosis were seen. The bladder appeared normal; ovaries were not visualized. The uterus was absent.

From January until mid-February 1996, LG made 4 visits to Rubens/Dr Fritz. On the first visit, Rubens/Dr Fritz inserted a long needle, to a depth of 8 cm to 11 cm, over the right kidney. He did not operate, stating that the process was inflammatory and bacterial in origin. At the fourth visit, Rubens/Dr Fritz made a 6-cm incision with a surgical knife at the site of a preexisting hysterectomy scar and introduced several Kelly clamps, forceps, scissors, and other surgical instruments. No tissue was removed.

Because dissolvable suture material was not available at the time, no repair of the internal layers was performed beyond the healing given by the touch of Rubens/Dr Fritz's hands. The skin was sutured conventionally. On interview, the patient reported that there was no significant bleeding and she did not feel pain, despite the lack of an anesthetic. During the 3 following weeks, LG visited Rubens/Dr Fritz 3 times and was given injections of the alcohol-iodine-turpentine mixture. After the last consultation, Rubens/Dr Fritz advised LG to see her doctor for reexamination.

The second ultrasonography was made on March 4, 1996. All structures were normal, with no alteration in the adnexal region. There was no longer a cystic mass on the right adnexal topography, and the anatomy of the right ureter and pyelocalix were normal. The urologist declared her cured, and she has remained well up to this time (March 1997).

DISCUSSION

Despite the lack of sterile procedures and anesthesia, we observed no cases of infection, shock, or death resulting from these extraordinary practices. Pain was often absent. However, since our work in Brazil, 3 anecdotal reports of patients adversely affected by trance surgery have come to our attention. The cases we presented in this article, together with additional cases we have followed, also suggest that trance surgery sometimes is associated with the healing of serious illness that is not likely to improve without treatment.

Some of these positive results may be placebo response, including psychological effects promoting enhanced immune function. Also, even serious illnesses can sometimes resolve themselves. For example, if aortic aneurisms, such as the one reported in case 1, are not treated and the lesions do not rupture, a natural course of healing can occur, involving clot formation and then the formation of a fibrous layer.[25] After sufficient time, this layer might appear smooth to ultrasonography. Of course, whether this actually occurred in case 1 or whether the treatment promoted healing by other means we cannot know. Because of these ambiguities, without further detailed study it is impossible to come to any firm conclusions about treatment efficacy.

However, spontaneous disease resolution or placebo effects are not adequate explanations for the phenomenon as a whole. For example, how can Rubens/Dr Fritz give injections of toxic substances that cure and do not kill when injected into the carotid artery? How can *many* people, including infants, be sawed open with a dirty circular saw without disastrous consequences? How can severed large arteries be left in the body without suturing? We therefore believe that the hypothesis made by Greenfield[22] that immune system was enhanced due to self-hypnosis (spontaneously induced by environments endowed with special, cultural meanings) falls short of explaining the complete range of trance surgery.

In the *DSM-IV,* the American Psychiatric Association has noted that during states of possession trance, "individuals may have an increased pain threshold, may consume inedible materials (e.g., glass), and may experience increased muscular strength."[16(p728)] However, in Brazilian trance surgery, the surgeon is the one in trance, and we observed no hypnosis-induction procedures used on patients.

If Brazilian trance surgery involves patient hypnosis, then high-hypnotic ability, as measured by one of the standardized scales of hypnotizability, would be necessary. High levels of hypnotizability imply a tendency toward altered perceptions, as well as increased likelihood toward dissociative processes. It is estimated that only 5% to 15% of adults are highly hypnotizable and would require no formal trance induction for hypnosis. Thus, if hypnotic ability underlies Brazilian trance surgery, only a small percentage of people would be expected to be comfortable dissociating from such potentially significant levels of pain.[26,27] At least with some trance surgeons, *all* the patients we observed and videotaped appeared pain free, even during major intrusions, some into the peritoneal cavity. Furthermore, those patients appeared to sustain no short-term postoperative trauma; again, we have limited long-term data.

The possibility of a surgical placebo response naturally merits consideration. In a review, Johnson[28] noted the sparsity of well-designed studies and the complex and troublesome ethical issues in the area of sham surgery. Although estimating the true magnitude of the surgical placebo response is therefore difficult, Johnson[28] stated that "[a] review of several studies of internal mammary artery ligation showed that the magnitude of placebo effect surgery is about the same as for other placebo responses, i.e., 35%." From this and other evidence, he concludes that the placebo response is an important factor involved in surgical outcome. As impressive as this 35% figure is (and the placebo response can be as high as 60% for nonsurgical interventions), it still falls far short of explaining the apparent immunity from trauma that we observed in approximately 100% of a large number of trance surgery patients. (For other nonsurgical placebo studies, see Kienle and Kienle[29] and Tramer et al.[30])

We may entertain the possibility that trance surgeons powerfully influence the unconscious minds of their patients—including infants—telepathically toward healing, and exert a strong corrective influence on their bodies. Recent studies reported in the scientific parapsychological literature support the existence of both mind-to-mind and mind-matter effects,[31,32] as well as nonlocal effects on biological systems.[33] Such effects, even when they are statistically significant, are typically small deviations from ordinary chance, occurring only in a fraction of attempts or cases.

In contrast, trance surgery is a much larger-scale phenomenon than has been observed in parapsychological laboratories. Its most clear-cut success—in not causing significant damage—occurs at an extremely high rate, seemingly approaching 100%. Therefore, trance surgery may be other than a mental or already studied parapsychological effect, conscious or unconscious, that is transferred from the healer-medium to the patient. Alternatively, trance surgery could involve already studied parapsychological factors, but exercised at virtuoso levels.

The high-amplitude 36- to 44-Hz brain rhythms measured during possession states in all the trance surgeons we tested for this study seem unlikely to be fortuitous. The in-trance voltages were in an averaged range of 8.6 to 12.2 μV, with significantly more power than baseline, indicating enhanced arousal level. When measured on the scalp by the EEG or by their magnetic effects with the magnetoencephalogram, these 36- to 44-Hz rhythms are thought to be derived from thalamocortical circuits, and are involved importantly in arousal and attention.[34-36] Also, these rhythms, when occurring in phase in different, distributed neural systems of the brain, are increasingly being proposed as the "binding" mechanism subserving integrated perception, memory, learning, and consciousness.[37-40] Publication of the phase coherence analysis of our data is forthcoming; therefore, whether trance surgeons are in a state of highly integrated brain function remains to be determined.

The presence of these hyperaroused brain states, and a range of states of consciousness accompanying them, is likely to be common to a wide range of practices. These practices include

ecstatic, non-Western dancing; extended rituals such as those of the !Kung of Africa[41]; and "raising of the Kundalini," which exists in certain forms of East Indian yoga. Das and Gastaut[42] found the same broad-band 40-Hz brain rhythms (but at much higher voltage) that we detected in the trance mediums in this study. The subject of Das and Gastaut[42] was a guru in Calcutta engaging in Kundalini (and Karma) yoga practices, who was reported to be in a state of "yogic ecstasy" or *samadhi*. These disciplines produce physiological (and, Fischer[43] has argued, also mental) effects that are mostly opposite to the more familiar cortical and motor quieting of practices such as transcendental meditation.[44]

Sheldrake's[45] theory of morphogenetic resonance includes the element of the nonlocal spread of information among organisms (even geographically isolated from each other), once a critical number of individuals possess the information. This theory may be relevant in trance surgery, especially for phenomena occurring in a culturally circumscribed context, which may provide a favorable incubation for certain anomalies.

Hussein et al[46] have argued that invoking "altered states of consciousness" or "trance" has no real explanatory power, especially for "others-healing" phenomena. Instead, these researchers propose that whereas these phenomena are linked to certain unusual mental or spiritual states—which in their view may not have unique physiological bases—there is an associated subtle, nonphysical energy that is the agent producing the observed healing effects. This line of reasoning, involving a presumed subtle energy, is in accord with that proposed by Green and Green[5] in their "Field-of-Mind Theory."

Lending support to this point of view, during the tests on Rubens/Dr Fritz a random-event generator (REG)—an electronic device outputting a random distribution of electrons—was covertly run by the investigators. Although the distributions were random before and after the trance condition, the distribution was significantly nonrandom during the trance condition. Such results have led the investigators at the Princeton Engineering Anomalies Research (PEAR) laboratory, who have performed many REG experiments, to propose the existence of a "field of consciousness"[47-49] (note 2).

The actual nature of such a proposed field, which may be involved in healing and psychokinesis (PK) (ie, mind-matter effects) is unknown. It has been noted in healing studies that when the effects of healing seem to be present, only an intention to heal is needed. Detailed knowledge of the pathology and its cure seems to be unnecessary. Grad[50] has commented that the subtle energy is "intelligent" and knows what it is supposed to do.

Furthermore, in a classic experiment, Schmidt[51] dealt with the goal-oriented nature of PK. A comparison was made of REGs that were structurally similar but combined different numbers of binary numbers to create the target that was fed back to the subject. Schmidt[51] found that this made no difference, supporting the goal-oriented nature of PK.

Therefore, goal-orientedness, without detailed operator knowledge of the mechanism of effect, appears to be common to healing and PK, perhaps suggesting that PK is the "mechanism" involved in anomalous healings. The field propagating these effects might be termed "subtle energy." Another model, derived from laboratory data, has been put forward by Don et al[52] and consists of a "correlation field" operating outside of space and time, which yields macroscopic effects. What is propagated in this model is not a subtle energy, but correlations—meaningful linkages—that yield holistic and even macroscopic effects in accord with the intended goal. However, trance surgery seems to approach 100% in the avoidance of injury, whereas the subtle energy and correlation models that are derived from laboratory experimentation have far smaller effect sizes.

Finally, as tempting as it is to disregard the Spiritists' own explanations for these phenomena, it would be arrogant for us to reject them out of hand, even though it is likely that trance mediums in very altered states of consciousness may well interpret these states as ego alien. After all, trance surgery is a strong anomaly that is culturally bounded and should not be possible according to the contemporary Western scientific worldview. Furthermore, the scale of these phenomena goes well beyond what is observed in parapsychology experiments.

Whatever the ultimate answer may be, it seems to us that the phenomena we have described and the data we have gathered suggest the existence of healing pathways overarching the precepts of current biomedical theory. In whatever way the medium (or, according to the trance surgeons, the medium/spirit) influences the patient's body, the effect on the deep structures of the brain (and through them on the endocrine, immune, and other major systems) can be explored with PET and fMRI scans. By determining which centers of control are involved, a potential new field of research and eventually new clinical methodologies could open up.

These unusual procedures and the explanations we have submitted in this paper may help investigators of complementary and alternative health practices in hypothesis formulation when planning experiments, even if the phenomena we have dealt with in this paper are not addressed per se. Also, with increased public interest in complementary and alternative medicine, healthcare practitioners may feel the need to be informed about such practices to answer patient questions.

Well-controlled, parametric studies of the clinical efficacy of trance surgery do not exist. There would indeed be major obstacles to bringing trance surgery into a formal, medical environment in which well-controlled studies could be performed. However, PET or fMRI studies of less extreme self-impaling practices may be more acceptable to institutional review boards. Clearly, our presentation in this article is preliminary and needs follow-up investigation.

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Notes

1. To produce unbiased power calculations, all artifact-free data were used, even though the 40-Hz rhythmic activity was only intermittently present. Thus, the 40-Hz power differences between trance and baseline were greatly diluted, but even so were statistically significant. The computations were performed on the log of the power density, ie, the sum of the log of the power in all spectral lines 36 to 44 Hz divided by the number of spectral lines, which was 8. There was more power in trance (Cz, 0.498 relative units; Pz, 0.545 relative units) than in baseline (Cz, 0.285 relative units; Pz, 0.297 relative units). Also, to control for possible scalp muscle contamination of the 40-Hz EEG, only midline sites Cz and Pz were analyzed, which do not overlie muscle tissue. Furthermore, we employed a special statistical method to balance out any possible residual electromyogram effects.[51]
2. In a study of another group of Brazilian subjects engaging in altered states of consciousness,[52] we found that high-voltage, 40-Hz brain waves were associated with nonrandomness of REGs, suggestive of a propagated "field" associated with this brain state.

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