



Effect of hypnosis on induction of local anaesthesia, pain perception, control of haemorrhage and anxiety during extraction of third molars: A case–control study

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ABSTRACT

Introduction: Systemic conditions are considered limiting factors for surgical procedures under local anaesthesia in the oral cavity. All the pharmacological methods to control pain in patients have some disadvantages, such as side effects and extra costs for rehabilitation. Therefore, in such cases alternative treatment modalities are considered, such as hypnosis in dentistry. The aim of the present study was to evaluate the effect of hypnosis on haemorrhage, pain and anxiety during the extraction of third molars.

Materials and methods: In this case–control study, 24 female and male volunteers were included. The subjects had been referred to the Department of Oral and Maxillofacial Surgery, Kerman University of Medical Sciences, for extraction of third molars. Demographic data for all the subjects were recorded. Patients with chronic medical conditions were excluded. The patients were used as their own controls, with the third molars on one side being removed under hypnosis and on the opposite side under local anaesthetic.

Hypnosis was induced by one of the two methods, either fixing the gaze on one point or Chiasson's technique; both these methods are appropriate for patients in the dental chair. The Spielberger State-Trait Anxiety Inventory was used to determine patient anxiety levels before hypnosis and anaesthesia. Pain was scored using VAS (visual analogue scale). After surgery the patient was asked to bite on a sterile gauze pad over the surgical site for 30 min when haemorrhage from the area was evaluated. If there was no haemorrhage the patient was discharged. If haemorrhage persisted, the gauze pad was left in place for another 30 min and the area was re-evaluated. Any active oozing from the area after 30 min was considered haemorrhage. Haemorrhage, anxiety and pain were compared between the two groups. Data was analyzed using the *t*-test, McNemar's test and Wilcoxon's signed rank test using SPSS 18 statistical software.

Results: Twenty-four patients were evaluated; there were 14 males (58.3%) and 10 females (41.7%). The mean age of the subjects was 24.1 ± 2.7 years (age range = 18–30 years). A total of 48 third molars were extracted. In each patient, one-third molar was extracted under hypnosis and the other under local anaesthesia. All the patients were in the ASA 1 category (normal) with no significant medical history.

Of the subjects who underwent hypnosis, only two subjects (8.3%) reported pain after induction of hypnosis. In the local anaesthetic group, 8 subjects (33.3%) reported pain. There was a significant difference between the two groups. The results of the study showed that patients in the hypnosis group had less pain during the first few hours post-operatively. Anxiety scores in the two groups were very close to each other and no statistically significant differences were observed in general and when each person was compared with himself or herself. Pain intensity in the two groups at 5- and 12-h post-operatively exhibited significant differences. In the hypnosis group, 10 patients (41.7%) took analgesic medication; in the local anaesthesia group, 22 patients (91.7%) took the analgesic medication ($P = 0.0001$). In other words, patients reported less pain when they were under hypnosis.

Conclusion: The results of the study showed that hypnosis can effectively reduce anxiety, haemorrhage and pain. More studies are necessary to collect data on the effect of hypnosis on oral and maxillofacial surgeries.

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1. Introduction

Hypnosis has a long history in the treatment of diseases. Cuneiform tablets dating from 4000 BC show that Sumerians knew about hypnosis. Persian Moghans or Iranian religious leaders before Islam used hypnosis in the treatment of diseases. The first academic treatment centre to officially use hypnosis to treat patients was the Nancy Medical Faculty. The dean of this French medical institution was Professor Hippolyte Bernheim (1840–1919), the prominent neurologist, who instituted the application of hypnosis in the various clinics of Nancy Medical Faculty after becoming acquainted with hypnosis and realizing its efficacy in the treatment of some medical conditions. In 1953 a committee was established by the British Medical Association, which consisted of several psychologists and psychiatrists, to carry out serious and detailed investigations into hypnosis and its therapeutic applications. The investigations of the committee showed that hypnosis can be used as a thoroughly scientific technique, not only in the treatment of psychosomatic and psychoneurotic conditions, but also in dental procedures, painless parturition, relief of pain and in surgery (Ross, 1981). At present, hypnosis has a large number of applications in medicine, including alleviation of acute pain, decrease in labour pain, treatment of trigeminal neuralgia, paediatric medicine, asthma, various surgical procedures, burns, migraine and tension headaches, neck and back pain, a wide range of chronic pain syndromes, chronic pain of cancer, arthritis and diabetic neuropathy (Rosen and Harold, 1954; Andrew and Welbury, 1996). Hypnosis can negate the need for local anaesthetic agents; in other words, it results in a feeling of anaesthesia in an area (Joseph, 1998).

Hypnodontics is a branch of dentistry, in which use of hypnosis for dental procedures is discussed (Joseph, 1998). Some people talk about dental visits in a manner as if they were the most painful experiences on earth.

The majority of dental patients referred to a dental office for the first time or those who have experienced great pain during previous dental visits and almost all the children and adolescents, visit dental offices with a degree of panic and great anxiety. If patients' fears can be quelled, therapeutic procedures will be carried out in a more acceptable atmosphere and the pain threshold of these patients will increase to a higher level (Islam et al., 2012; Habal, 2009). If patients undergo hypnosis, it will be possible to make some suggestions and under such conditions they will have no fear of dental visits. The patients will then be able to tolerate dental procedures and will not experience any anxiety or fear in the dental chair. Fortunately, such suggestions are very effective even under light hypnosis. The majority of patients referred to dental offices can be easily put under this level of hypnosis (Joseph, 1998). Sometimes it is not possible or advisable to use local anaesthetic agents; in such cases hypnosis can be highly successful.

Local anaesthesia may fail due to technical errors, such as the absence of teeth used as guides during injection.

The injection of local anaesthetic may be accompanied by complications, such as lingual nerve damage (Erdogmus et al., 2008) or pseudoaneurysm of the facial artery (Choi et al., 2012).

There are some studies on the use of hypnosis for some procedures, including reducing patients' anxieties and fears, prevention of excessive haemorrhage during tooth extraction in patients with haemophilia or high blood pressure, preparation of patients for induction of anaesthesia, decreasing or inhibiting salivary flow, taking impressions without nausea and vomiting for prosthetic and orthodontic procedures, treatment of some adverse oral habits such as bruxism, thumb sucking and nail biting, disorders of the temporomandibular joint, promotion of oral hygiene and increasing patient tolerance during long periods of mouth opening

(Gerschman, 1989; Chaves, 1997a, 1997b; Bassi et al., 2004; Cuellar, 2005; Hermes et al., 2005).

The first documented case of the use of hypnosis in dentistry to induce anaesthesia and ease patient fear was reported by Jean-Victor Oudet who, in 1829, used hypno-anaesthesia to facilitate a dental extraction. In 1847 two more pioneering French doctors (Ribaud and Kiaro) used hypnosis for anaesthesia to be able to remove a tumour of the jaw (Chaves, 1997a, b).

One of the reasons for not attending dental offices is patient anxiety and fear of dental procedures, including the injection of local anaesthetic agents. In some cases it is difficult or even impossible to achieve proper anaesthesia and patients may feel pain even with multiple and consecutive injections of local anaesthetic agents, disrupting the treatment procedure. In some cases the use of local anaesthetic agents is contraindicated. In order to address these issues this study aimed to evaluate the success rate of hypnosis in inducing local anaesthesia, decreasing haemorrhage, pain perception and reducing anxiety during surgical extraction of the third molars.

2. Materials and methods

This case-control study was approved by the ethics committee of the Kerman University of Medical Sciences (No.k.90.140). The study was carried out in the Department of Maxillofacial Surgery, Faculty of Dentistry, Kerman University of Medical Sciences. A purpose-oriented sampling procedure was used and only patients who needed bilateral surgical extraction of mandibular or maxillary third molars were included in the study. The subjects were all over 18 years of age from both sexes. Demographic data including age, sex and educational level were recorded. A panoramic radiographic view was requested if the patient did not have one. Only patients in Class AI category based on Pell and Gregory classification were included in the study (Fig. 1). The last inclusion criterion was no difference in the vertical dimension of eruption and buccal or lingual tilt of the teeth. None the teeth had severe caries.

The subjects were in ASA 1 from a systemic point of view (ASA 1: normal individuals). None of the patients were diagnosed with emotional and mental problems by a psychiatrist. None of the patients used addictive or euphoric drugs or took additional medication. The patients had no systemic problems, such as coagulation problems, including haemophilia and platelet disorders. Patients who could not concentrate or were unable to accept hypnosis were excluded from the study and patients who provided positive responses to evaluations were included (Flammer and Bongartz, 2003; Hermes et al., 2005; Eitner et al., 2006). After the patients qualified for the study their questions in relation to hypnosis and the study procedures were recorded. Adequate explanations were provided in relation to advantages and possible disadvantages of hypnosis and following explanation of the study procedures informed written consent was obtained.

The Spielberger State-Trait Anxiety Inventory was used to determine patient anxiety levels before hypnosis and anaesthesia. The questionnaire consists of 20 questions on different aspects of anxiety with responses of not at all (score 1), to some extent/a little (score 2), moderate (score 3) and rather high (score 4). The scores range from 20 (no anxiety) to 80 (the highest anxiety level). As the score increases, the anxiety level increases at that particular moment (Kvaal et al., 2005).

Hypnosis was induced by one of two methods; fixing the gaze on one point or Chiasson's technique; both these methods are appropriate for patients on the dental chair. In the Chiasson's technique the patient is asked to place her/his hand in front of face, palm facing away, with the fingers held together about 1 foot from the face. In this position, a natural strain takes place on the fingers

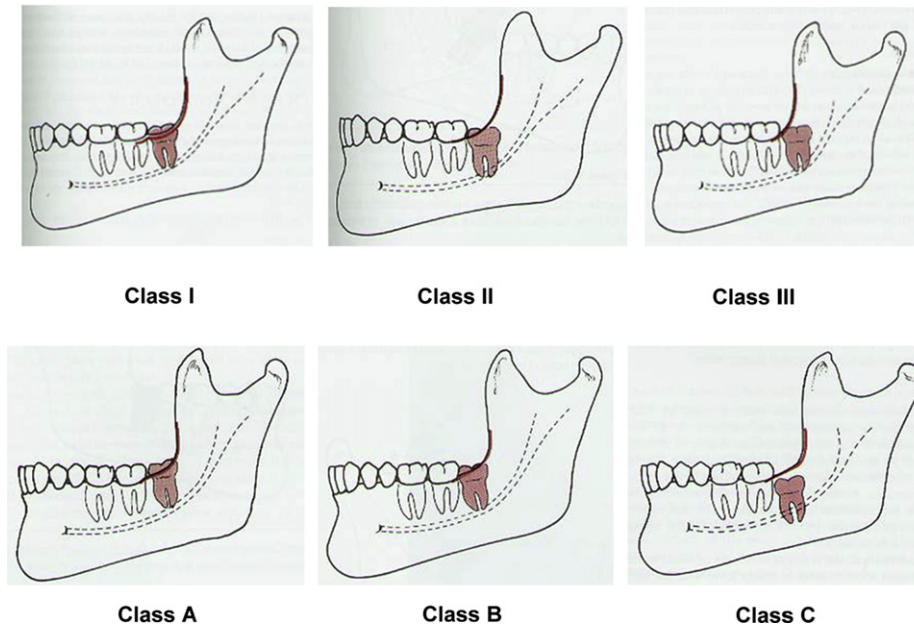


Fig. 1. Pell and Gregory classification.

to begin to spread and, when accompanied by a suggestion to this effect linking the spreading of the fingers to entering the hypnotic state, it can be quite enticing to the patient to “let go and enter the hypnotic state” (Daniels, 1977). Amongst all of the existing hypnosis method, a traditional one is fixing the gaze on one point or fixation induction. This draws subject’s attention to the fixation object such as a pendulum or a dot on the wall. As concentration focuses on the fixation object, the subject’s attention is drawn away from external sights and sounds (Page and Handley, 1991).

Hypnosis was deepened by presenting proper suggestions and induction of local anaesthesia in the patient’s hand. The patient was asked a question about the anaesthesia at the location. A hypnotized patient can reply by moving a finger. If anaesthesia was in effect the time was recorded. Then anaesthesia was transferred to the tooth area involved. To this end the finger of the anesthetized hand was moved to touch the tooth and the adjacent soft tissues, which resulted in anaesthesia in that location. Suggestions continued to deepen the anaesthesia in the area. Then the therapeutic procedure was carried out by one of the professors in the department. The side to be operated on was selected randomly (case group) and the other side underwent surgery after an injection of lidocaine 2% with 1:100,000 epinephrine (nerve block or infiltration techniques) at a second visit (control group) with the two-week washout.

If pain was present, an attempt was made to induce anaesthesia; if it was not successful (feeling of pain in the soft tissue of the area by application of a sharp-pointed instrument such as an explorer or a needle), a supplementary local anaesthetic agent was injected. Appropriate post-hypnosis suggestions were given and the previous suggestions such as anaesthesia of the hand and muscle relaxation were eliminated, following which the patient was returned to the normal state by observing the principles of hypnotherapy. The patient was asked to bite on a sterile gauze pad at the surgical site for 30 min. Haemorrhage from that area was evaluated. If there was no haemorrhage the patient was discharged. If haemorrhage persisted, the gauze pad was left in place for another 30 min and the area was re-evaluated. Any active oozing from the area after 30 min was considered haemorrhage. The patients were contacted by phone

at 5-, 12-, 24-, and 48-h post-operative intervals to evaluate haemorrhage (Enqvist et al., 1995; Nooh, 2009). Pain was scored using a VAS (visual analogue scale). The patients were asked to mark pain intensity at 5-, 12-, 24-, and 48-h post-operative intervals on a horizontal line graded from 0 to 10. The patients were given Gelofen capsules (Ibuprofen) for pain relief and were asked to take the medicine if pain persisted and record the number of the tablets taken. All the above-mentioned measurements were recorded for both sides of each patient. Data was analyzed by McNemar’s and Wilcoxon’s signed ranks tests and *t*-test using SPSS 18.

3. Results

In this study 24 patients were evaluated; there were 14 men (58.3%) and 10 women (41.7%). The mean age of the subjects was 24.1 ± 2.7 years, with mean ages of 23.6 ± 1.9 and 24.7 ± 3.7 for males and females, respectively. The age range of the subjects was 18–30 years, with 21–27 and 18–30 years for males and females, respectively. A total of 48 third molars were extracted: 15 right upper third molars, 15 left upper third molars, 9 right lower third molars and 9 left lower third molars. In each patient, one-third molar was extracted under hypnosis and the other under local anaesthesia. All the patients were in the ASA 1 category (normal) with no medical history.

Only two patients in the hypnosis group (case) reported pain after induction of hypnosis (8.3%), with 22 patients (91.7%) reporting no pain. In the local anaesthesia group (control), 8 patients (33.3%) reported pain during the procedure despite complete anaesthesia of the tongue and the adjacent mucosa, demonstrating statistically significant differences between the two groups. The patients were asked to stay in the department for 30 min after the procedure so that haemorrhage could be evaluated. The results showed less haemorrhage in patients who had undergone hypnosis, with significant differences with the patients who had only received local anaesthesia (Table 1).

Tables 1 and 2 show the haemorrhage scores in the two groups, with significant differences between the two groups in relation to the presence of haemorrhage and at 5- and 12-h post-operative

Table 1
Frequency of pain, oozing and bleeding in case and control groups.

	Case		Control		Exact sig. (2-tailed) ^a
	Yes	No	Yes	No	
	Number (%)	Number (%)	Number (%)	Number (%)	P-value
Pain	2 (8.3)	22 (91.7)	8 (33.3)	16 (66.7)	0.04**
Oozing	3 (12.5)	21 (87.5)	11 (45.8)	13 (54.2)	0.008**
Bleeding	6 (25)	18 (75)	16 (66.7)	8 (33.3)	0.021**

**P value significant.

^a McNemar test.**Table 2**
Frequency of bleeding after tooth extraction at different hours in case and control groups.

	Case		Control		Exact sig. (2-tailed) ^a
	Bleeding		Bleeding		
	Yes	No	Yes	No	P-value
	Number (%)	Number (%)	Number (%)	Number (%)	
After 5 h	5 (20.8)	19 (79.2)	10 (41.7)	14 (58.3)	0.001**
After 12 h	1 (4.2)	21 (87.5)	5 (20.8)	19 (79.2)	
After 24 h	0 (0)	24 (100)	1 (4.2)	23 (95.8)	
After 48 h	0 (0)	24 (100)	0 (0)	0 (0)	

**P value significant.

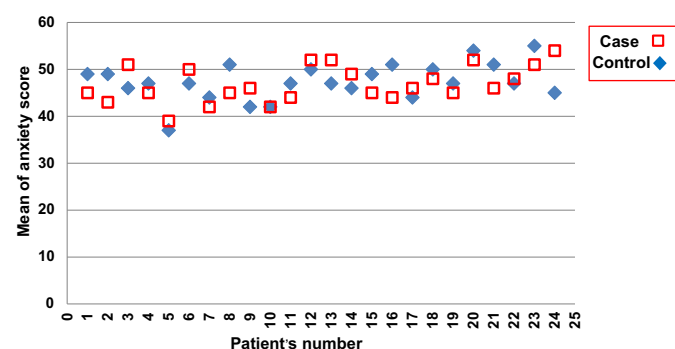
^a McNemar test.

intervals. Haemorrhage was greater in the local anaesthesia group compared to the hypnosis group.

The Spielberger State-Trait Anxiety Inventory was used to evaluate patient anxiety. The results showed mean anxiety scores of 46.8 ± 3.8 and 47.4 ± 3.9 in the local anaesthesia and hypnosis groups, respectively, revealing very close anxiety scores in the two groups under study. On the whole, the two procedures were not significantly different when the two sides were compared in each subject. In other words, hypnosis did not result in an increase in patients' anxiety (Table 3 and Fig. 2).

Table 3
Mean, standard deviation, maximum and minimum of anxiety scores in case and control groups.

	Case	Control	Correlation	t	df	Exact sig. (2-tailed) ^a
Mean \pm SD	47.4 ± 3.9	46.8 ± 3.8	0.440	0.641	23	0.528
Min	37	39				
Max	55	54				

^a t Test.**Fig. 2.** Comparison of mean of anxiety scores obtained by each individual (case and control).

Tables 4 and 5 show post-operative pain severity in patients based on VAS. Wilcoxon's signed rank test showed significant differences in pain severity at 5- and 12-h post-operative intervals between the two groups, with patients undergoing hypnosis reporting less pain.

In this study the patients were asked to take only Gelofen when they had pain. In the hypnosis group, 10 patients (41.7%) took the medicine; in the local anaesthesia group, 22 patients (91.7%) took the medicine. McNemar's test revealed statistically significant differences between the two groups in this regard ($P = 0.0001$). The means of the analgesic capsule taken were 1.9 ± 1.2 (at least one capsule and at most 5 capsules) and 2.1 ± 1 (at least one capsule and at most 4 capsules) in the hypnosis and local anaesthesia groups respectively, with significant differences between the two groups ($P = 0.021$). In addition, the mean days of taking the analgesic post-operatively were reported to be 1.3 ± 0.7 (at least one day and at most three) and 1.2 ± 0.3 (at least one day and at most two) days in the hypnosis and local anaesthesia groups, respectively. Wilcoxon's signed ranks test did not reveal any significant differences in the number days the analgesic was taken between the two groups ($P = 0.705$).

4. Discussion

Hypnosis has been a worldwide controversial issue in dentistry in recent times; the controversy has spread to the academic circles in Iran.

Hypnosis influences perceptions and behaviours of individuals with the help of two factors: use of suggestibility rules and achieving a state referred to as hypnotic trance. A trance is a state beyond consciousness, which is different from normal sleep, unconsciousness and coma, during which there is a high level of suggestibility (Chaves, 1997a, 1997b; Elkins et al., 2007).

Hypnosis has some applications in the treatment of somatic and psychological problems and is recognized as an adjunct to medicine in some countries. Various studies have been carried out on its

Table 4
Frequency of pain after tooth extraction at different hours in case and control group.

	Case		Control		Exact sig. (2-tailed) ^a
	Pain		Pain		
	Yes	No	Yes	No	P-value
	Number (%)	Number (%)	Number (%)	Number (%)	
After 5 h	19 (79.2)	5 (20.8)	22 (91.7)	2 (8.3)	0.001**
After 12 h	10 (41.7)	14 (58.3)	16 (66.7)	8 (33.3)	
After 24 h	6 (25)	18 (75)	8 (33.3)	16 (66.7)	
After 48 h	6 (25)	18 (75)	6 (25)	18 (75)	

**P value significant.

^a McNemar test.**Table 5**
Mean, standard deviation, maximum and minimum of pain according to VAS in case and control groups.

	Case			Control			Exact sig. (2-tailed) ^a
	Pain			Pain			
	Mean \pm SD	Min	Max	Mean \pm SD	Min	Max	
After 5 h	2 ± 2.1	0	8	4.5 ± 2.4	0	9	0.002**
After 12 h	1.6 ± 1	0	5	2.3 ± 2.2	0	6	0.033**
After 24 h	0.5 ± 0.3	0	2	0.8 ± 0.4	0	5	0.072
After 48 h	0.5 ± 0.3	0	2	0.7 ± 0.3	0	2	0.623

**P value significant.

^a Wilcoxon signed ranks test.

applications in different fields, including dentistry. For example, hypnosis can be used to decrease stress, phobia, nausea, haemorrhage, salivary flow, and reduce or eliminate pain (Chaves, 1997a, 1997b). The Second World War contributed to the progress of hypnosis in dentistry. During the war a lot of wounds were inflicted on the maxillofacial structures of the soldiers and in many cases medicines were not readily available; therefore, hypnosis was applied. After the war, dental practitioners began discussions about the interesting applications of hypnosis. In 1954 a need arose in a detention centre, which was not well-equipped with dental facilities and instruments, for emergency surgery. Twenty-nine individuals underwent surgery, with good results in 23 of them; in 4 individuals minor trance was achieved and 3 individuals were not hypnotized. Dental practitioners continued to create conditions in which the patients would experience less pain and suffering and the use of hypnosis has become very common in modern dentistry. In addition to tooth extraction, hypnosis is used in other dental procedures with numerous reports indicating that many dental procedures have been carried out under hypnosis by a large number of dental practitioners (Heron, 1954).

This study evaluated the effect of hypnosis on pain, haemorrhage and anxiety after extraction of third molars. The results showed that of patients undergoing hypnosis only 2 patients reported pain after induction of hypnosis and 22 patients did not report any pain; there were significant differences between the local anaesthesia and hypnosis groups.

In a one-year period a combination of local anaesthesia and hypnosis on 174 patients 13–87 years of age showed that hypnosis resulted in a decrease in pain severity in patients and in 93% of the cases good progress was achieved in the therapeutic protocols (Hermes et al., 2005).

Andrew and Welbury (1996) put 20 children under hypnosis and reported that in 16 children under simultaneous hypnosis and anaesthesia there was a decrease in pain perception, consistent with the results of this study. In a study carried out by Attaran et al. (2012) 16 subjects of 21 volunteers (76.2%) had a good depth of anaesthesia and 5 subjects (23.8%) did not exhibit a proper response to local anaesthesia; the differences between the results of the two studies might be attributed to the fact that they applied hypnosis for root canal therapy and it is probable that the difference between root canal therapy and tooth extraction or problems such as infection might have resulted in differences in the results.

In relation to immediate post-operative haemorrhage and at 5- and 12-h post-operative intervals the results of the present study showed less haemorrhage in the hypnosis group, with statistically significant differences between the two groups.

At present one of the uses of hypnosis is in surgical procedures in patients with coagulation disorders. The effect of stress on the initiation and control of haemorrhagic attacks is an established fact. Oral surgery is a common cause of severe anxiety in patients with haemophilia. Lucas evaluated research studies in this respect, reporting that hypnosis can be a superb adjunct to control anxiety, and in haemophilic patients with a tendency for haemorrhage during or after the surgical procedure it can significantly decrease haemorrhage. In addition, salivary secretions, pain and capillary haemorrhage can be properly controlled during surgery or after it. Furthermore, some oral habits such as brushing and use of dental floss, which are very important for the oral hygiene of such patients, can be suggested under hypnosis (Lucas, 1975).

Some other studies have evaluated the effect of hypnosis on reducing haemorrhage and duration of patient hospitalization, all showing the positive effect of hypnosis on haemorrhage.

Enqvist et al. put a number of patients under hypnosis tape in different phases of treatment, including 18 patients during pre-operative treatment, 18 patients during pre- and perioperative

treatment, and 24 patients perioperatively only. The amount of blood loss in the patients was equal to 30%, 26% and 9% in groups one to three, respectively (Enqvist et al., 1995). Rapkin et al. put 15 patients under hypnosis, who were candidates for head and neck surgery and compared them with 21 patients who did not go under hypnosis, reporting that hypnosis reduced haemorrhage and other surgical complications; it even decreased the duration of patient hospitalization (Rapkin et al., 1991).

Defechereux et al. showed in their research study that from 197 thyroidectomies and 21 cervical explorations for hyperparathyroidism which were under hypno-anaesthesia, all patients having hypno-anaesthesia reported a significantly less haemorrhage. Hospital stay was also significantly shorter, providing a substantial reduction in the costs of medical care. The post-operative convalescence was significantly improved after hypno-anaesthesia and a full return to social or professional activity was significantly quicker (Defechereux et al., 1999).

A meta-analysis of studies of the effect of hypnosis in surgical patients was performed by Montgomery et al. The results indicated that patients in the hypnosis treatment groups had better clinical outcomes than 89% of patients in the control groups and less haemorrhage (Montgomery et al., 2001).

This study showed a close similarity of anxiety scores between the two groups and comparison of each subject with themselves did not reveal any significant differences; in other words, hypnosis did not increase patient anxiety.

Researchers believe hypnosis decreases patient anxiety in relation to dental procedures. Currently one of the most common uses of hypnosis is to decrease patient anxiety and fear of dental procedures. Huet et al. carried out a study on 30 children 5–12 years of age and reported that the median modified Yale preoperative anxiety scale was significantly lower in the hypnosis group than in the non-hypnosis group (Huet et al., 2011).

Moore et al. evaluated 25 patients (the hypnosis group) and compared them with 31 patients (no hypnosis group) and showed that hypnosis reduces patient anxiety during dental procedures (Moore et al., 1996).

Eitner et al. put an extremely anxious patient with intense fear of dental procedures under hypnosis and measured the patient's heart rate, blood pressure and blood cortisol level, reporting that hypnosis can reduce anxiety even in extremely anxious patients (Eitner et al., 2006).

The results of this study showed that when patients were under hypnosis and local anaesthesia, they reported less pain after tooth extraction and took fewer analgesics, which is consistent with the results of other studies. There are a large number of medical studies on the effect of hypnosis on pain decrease and use of fewer analgesics. In a review study carried out by Montgomery et al. on 18 studies about the effect of hypnosis on pain decrease and use of fewer analgesics the results showed that hypnosis decreases the surgical complications and the number of analgesics used, resulting in fast recovery of patients (Montgomery et al., 2000, 2001).

Mauer et al. (2002) showed that hypnosis decreases patient pain in orthopaedic operations on the hand. Sixty hand-surgery patients received the usual treatment or usual treatment plus hypnosis. The hypnosis group showed significant decreases in measures of perceived pain intensity, perceived pain affect. In addition the physician's ratings of progress were significantly higher for experimental subjects than for controls, and the experimental group had significantly fewer medical complications. Defechereux et al. showed that all patients (218 cases) having hypno-anaesthesia reported significantly less post-operative pain and analgesic use (Defechereux et al., 1999).

Lang et al. put 82 patients who were candidates for invasive medical procedures under self-hypnotic relaxation and compared

them with 159 patients who did not go under hypnosis. It was reported that self-hypnotic relaxation proved beneficial during invasive medical procedures. Hypnosis had more pronounced effects on pain and anxiety reduction, and is superior, in that it also improves haemodynamic stability (Lang et al., 2000).

There is evidence that hypnosis can affect pain processing pathways in the brain. Rainville et al. provided PET (positron emission tomography) scans of some volunteers who burned their hands with hot water. Induction of hypnosis in these volunteers resulted in reports by the volunteers that water was not painful and burning. PET scan during hypnosis showed a significant decrease in the activity in the anterior cingulate cortex, which is the part of the brain involved in emotions and stresses and can influence inhibition of pain. On the other hand, PET scan results did not reveal any decrease in the activity of somatosensory cortex during hypnosis, which is the part of the brain processing perception of pain (Rainville et al., 2003). These findings show that even if the brain perceives pain, hypnosis helps patients alter pain experience so that the patient does not feel any pain and discomfort (Patterson, 1996). In addition, hypnosis can be used successfully in reducing different forms of pain. Hypnosis is used in burn victims along with debridement and cleansing of burn wounds to decrease pain and anxiety as a result of burns. In addition, in patients with cancer, hypnosis can help decrease pain and suffering of a large number of painful procedures, including chemotherapy and nausea. Furthermore, hypnosis can decrease the frequency and severity of migraine and tension headaches (Barber, 1996).

5. Conclusion

The results of this study show that hypnosis might be used as an adjunctive method in dental procedures of anxious patients or patients who cannot be treated using conventional methods. It should be pointed out that hypnosis is possible when the dental practitioner is adequately experienced in this respect and the patients are carefully selected.

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