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Does deep breathing reduce intra-operative anxiety and pain perception in patients undergoing dermatosurgery?

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**Does deep breathing reduce intra-operative anxiety and pain perception
in patients undergoing dermatosurgery?**

A prospective study.

THESE

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par

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Does deep breathing reduce intra-operative anxiety and pain perception in patients undergoing dermatosurgery?

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Résumé

CONTEXTE

La chirurgie cutanée sous anesthésie locale est source d'anxiété et de douleur pour les patients. Jusqu'à maintenant, les méthodes de relaxation peropératoires ont montré une efficacité variable pour les réduire. La respiration profonde est une méthode de relaxation connue depuis longtemps, mais pour laquelle l'efficacité en dermato-chirurgie n'a jamais été examinée.

OBJECTIFS

Évaluer l'effet de la respiration profonde sur l'anxiété et la douleur ressenties durant les interventions de dermato-chirurgie.

MÉTHODE

Nous avons effectué une étude randomisée contrôlée pour évaluer l'effet de la respiration profonde sur l'anxiété et la douleur ressenties durant les interventions de dermato-chirurgie en anesthésie locale. Les patients ont été attribués au hasard au groupe test (avec respiration profonde; n=76) ou au groupe contrôle (sans instruction ; n=76). L'anxiété et la douleur ont été mesurées à l'aide de scores validés cliniquement.

RÉSULTATS

Les deux groupes ont montré une distribution similaire en termes d'âge, de sex-ratio, d'ASA-score, de comorbidités, de durée d'intervention, de dosage d'anesthésie locale et de localisation des lésions.

Alors que l'anxiété préopératoire a été évaluée à des niveaux similaires dans les deux groupes, on a pu relever un niveau d'anxiété significativement réduit dans le groupe ayant effectué une respiration profonde. Nous avons également pu relever une douleur peropératoire réduite dans le groupe ayant effectué une respiration profonde.

CONCLUSION

La respiration profonde réduit significativement l'anxiété et la douleur des patients lors d'interventions de dermato-chirurgie réalisées en anesthésie locale. Cette méthode simple peut facilement être implémentée à la pratique clinique quotidienne pour le confort des patients.

Deep Breathing Reduces Intraoperative Anxiety and Pain Perception in Patients Undergoing Dermatologic Surgery

Patients undergoing dermatologic surgery interventions under local anesthesia may experience anxiety and pain. An extraordinary repertoire of noninvasive relaxation techniques such as listening to music, mindful meditation, biofeedback to progressive muscle relaxation, and yoga positions have been developed to alleviate these issues. In the field of dermatologic surgery, however, the potential role of relaxation methods is still unclear.[1]

Deep breathing, also called diaphragmatic breathing, is a well-known relaxation technique, consisting of breathing slowly (<10 breaths/minute), contracting the diaphragm and expanding the belly, thereby increasing parasympathetic activity, activating cerebral activity, and reinforcing emotional stability.[2] Here, we propose to test the effect of preoperative deep breathing on anxiety and pain experienced by patients undergoing typical skin surgical procedures.

Material and Methods

Study Population

This study was conducted in compliance with the ethical guidelines of the 1975 Declaration of Helsinki as reflected in its approval by the Swiss National Ethical Committee. Every patient was asked to give his informed consent before the start of the procedure. Patients were eligible for inclusion if aged 18 or more, were undergoing a skin surgical procedure under local anesthesia, had a general health status American Society of Anesthesiologists (ASA) ≤ 3, and were able and willing to give their consent for the study. The exclusion criteria encompassed Mohs micrographic procedures, uncontrolled psychiatric disorders, current medication with tranquilizers, visual/ hearing limitations, prisoners, and general anesthesia. Of the 185 patients assessed for eligibility, 15 were excluded. Overall, 170 people were randomized into 84 individuals in the "no instruction" group (NI) and 86 individuals in the "deep breathing instruction" group (DBI). After randomization, 8 patients in the NI group and 10 patients in the DBI group were dropped out because of missing data in the postoperative questionnaire. Altogether, completed data were obtained for 76 patients in each group.

Study Design

The study was designed as a single-blind randomized controlled study. Patients admitted in the outpatient clinics for dermatologic surgery at University Hospital of Lausanne were randomly assigned to the DBI or NI groups according to their scheduled appointment. The medical team was not informed of the patient's assignment. An external member of the medical team, previously instructed by an experienced nurse in this field,

explained to DBI patients how to perform deep breathing in the following terms: "breathe slowly and deeply until feeling a movement of the belly, close your eyes and focus on pleasant thoughts or situations." Patients were requested to repeat the instructed procedure as often as desired before and during surgery. Anxiety was assessed using the clinically validated 6-item State-Trait Anxiety Inventory (STAI; score range from 6 to 24),[3] Amsterdam Preoperative Anxiety and Information Scale (APAIS; score range from 6 to 30),[3] and a visual analog scale (VAS; score range from 0 to 10).[3] Pain was assessed using VAS (score range from 0 to 10).[4] Patients were asked to fill in the questionnaires both preoperatively (before instruction) and postoperatively regarding their intraoperative experience. In addition, age, sex, general health status (ASA score), comorbidities, type, localization and duration of the procedure, as well as the total dosage of the anesthesia were collected. Local anesthesia was performed using lidocaine 0.5% with epinephrine 1:400,000 buffered with sodium bicarbonate 8.4% in a 4:1 ratio, stored at room temperature (20–21°c).

Statistical Analysis

The calculated sample size to detect a minimal clinically relevant difference of 3 with an estimated variance of 5 in the STAI and APAIS scores and 1.5 with an estimated variance of 3 in the VAS was 62 per group, based on a Type I error of 0.05, and a Type II error of 0.2. Assuming a ratio of 20% of incomplete data, we decided to include at least 170 patients in total. Statistical comparisons were performed by a 2-tailed Student's *t*-test. A 2 proportion z-test was used for comparison of sex ratio, comorbidities, procedure types, and localizations. Statistical analyses were performed using GraphPad Prism (La Jolla, CA). Statistical significance was considered when $p < 0.05$.

Results

Study Population

No instruction and DBI patients were similar in term of age (NI: 60.2 ± 18.9; DBI: 60.7 ± 20.6; *p*-value 0.94), male/ female sex ratio (NI 1.05; DBI 1.45; *p*-value 0.09), and general health status (ASA score: NI 1.6 ± 0.6; DBI 1.5 ± 0.5; *p*-value 0.81). Comorbidities were evenly distributed in NI and DBI patients, with most patients presenting no comorbidities (NI 69.7%; DBI 60.5%; *p*-value 0.23). Importantly, anxiety disorders were reported with low frequency (NI 2.6%; DBI 1.3%; *p*-value 0.56). Metabolic issues (including diabetes) were reported with low frequency in both groups (NI 3.9%; DBI 9.2%; *p*-value 0.19). Peripheral neuropathy was found in one NI patient alone (NI 1.3%; DBI 0%; *p*-value 0.31). Surgical procedures were similar in term of duration (NI 33.1 +/15.4 minutes; DBI 29.9 ± 12.3 minutes; *p*-value 0.17) and similarly distributed

over the head (NI 18.4%; DBI 14.5%; *p*-value 0.63), trunk (NI 38.6%; DBI 38.2%; *p*-value 1), arms (NI 19.7%; DBI 27.6%; *p*-value 0.10), and legs (NI 23.6%; DBI 19.7%; *p*-value 0.76). Histological diagnoses encompassed melanocytic lesions (NI 39.4%; DBI 44.7%; *p*-value 0.50), basal cell carcinomas (NI 19.7%; DBI 26.3%; *p*-value 0.33), squamous cell carcinomas (NI 19.7%; DBI 15.8%; *p*-value 0.52), epidermoid cysts (NI 9.2%; DBI 3.9%; *p*-value 0.19), lipomas (NI 3.9%; DBI 6.6%; *p*-value 0.46), neurofibromas (NI 7.9%; DBI 1.3%; *p*-value 0.06), and schwannomas (NI 0%; DBI 1.3%; *p*-value 0.31).

Patients in both NI and DBI groups received similar dosage of local anesthetics (NI 8.3 ± 7.8 mL; DBI 6 ± 4.7 mL; *p*-value 0.26).

Effect of Deep Breathing Instruction on Anxiety

We first assessed the effect of DBI on patient anxiety. To do so, STAI, APAIS, and VAS scores were obtained both before surgery and instruction (preoperative anxiety) and after surgery (intraoperative anxiety). Preoperative scores revealed similar levels of anxiety in NI and DBI patients (STAI: NI 11.3 ± 3.7, DBI 10.2 ± 3, *p*-value 0.07; APAIS: NI 11.4 ± 5, DBI 11.0 ± 4.8, *p*-value 0.61; VAS: NI 1.3 ± 1.8, DBI 2.5 ± 2.4, *p*-value 0.11). By contrast, intraoperative anxiety was significantly lower in DBI compared with NI patients (STAI: NI 10.3 ± 3, DBI 7.8 ± 2.2, *p*-value 0.0001; APAIS: NI 9.9 ± 3.7, DBI 7.9 ± 2.9, *p*-value 0.0003; VAS: NI 3.2 ± 2.5, DBI 2.3 ± 1.8, *p*-value 0.0007).

To better assess the effect of DBI on anxiety, we measured the difference between intraoperative and preoperative anxiety individually (Figure 1). When compared with the preoperative score, both intraoperative STAI and APAIS scores had a statistically larger decrease in the DBI group compared with the NI group (ΔSTAI: NI 1 ± 3.4, DBI 2.3 ± 2.4, *p*-value 0.007; ΔAPAIS: NI 2.2 ± 3.8, DBI 3.7 ± 4, *p*-value 0.009). The visual analog scale score, however, did not reveal a significant difference between the NI group and the DBI group (ΔVAS: NI 0.94 ± 2, DBI 1.2 ± 2.1, *p*-value 0.79).

Effect of Deep Breathing Instruction on Pain Perception

Next, we assessed the effect of DBI on pain perception. The preoperative VAS score was collected to identify patients with pre-existing pain. After exclusion of 5 patients reporting skin-

Figure 1: Difference in the preoperative and intraoperative anxiety measured using STAI, APAIS, and VAS in NI and DBI patients. Horizontal bars on the box plots represent the median, minimum, and maximum values. ***p < .01; DBI, deep breathing instruction; ns: nonsignificant; NI, no instruction; VAS, visual analog scale.

unrelated pain, intraoperative VAS scores revealed reduced pain in DBI compared with NI patients (VAS: NI 1.3 ± 2, DBI 0.3 ± 0.7, *p*-value 0.0001; See **Supplemental Digital Content 1, Figures S2**, http://links.lww.com/DSS/A685).

Adverse Events

No study-related adverse events were reported during the study.

Discussion

Here, for the first time, we show that preoperative deep breathing instruction can reduce anxiety and pain experienced by patients undergoing typical dermatologic surgeries under local anesthesia. In practice, deep breathing may be easily instructed to patients while preparing for surgery and encouraged by the medical team during surgery. Preoperative scoring may help identify patients that would benefit the most from the procedure. In fact, relaxation methods may be particularly effective in patients experiencing high preoperative anxiety, as suggested by the higher efficiency observed in patients exposed for the first time to specific surgical procedures.[5] This further supports the need for additional studies with larger cohorts to identify patients and/or surgical procedures at a particular risk of intraoperative anxiety and pain.

Our study has limitations, however. First, we were unable to blind patients because they were taking an active part in the relaxation process. Still, patients were not informed of the positive or negative expectation regarding DBI on anxiety and pain, thereby limiting the information bias potentially introduced. Second, we cannot exclude that the medical team in charge may have been aware of the deep breathing performed during surgery and thereby inclined to adopt reassuring measures (such as verbal reassuring).
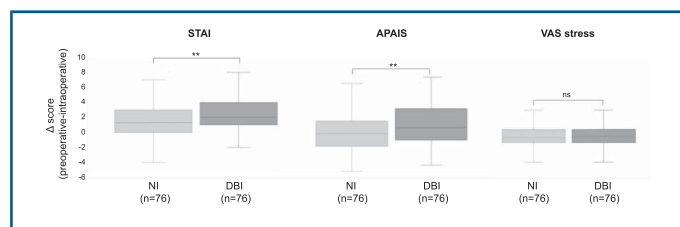
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