



Patients' satisfaction with the effects of microporous tape on surgical scars: a randomized controlled study

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INTRODUCTION

All surgical wounds give rise to scars, from thin lines that are barely noticeable to hypertrophic, atrophic, stretched, or keloidal scars. It has been shown in animal models and from clinical experience that tension influences scarring. Normal scars usually become hy-

Background Following surgery or other types of trauma, scar formation occurs with wound healing because of the replacement of normal skin with fibrous tissue. The conversion of a normal scar to an abnormal scar usually occurs 6 to 8 weeks after surgery. Abnormal scars can be a source of patient dissatisfaction, especially following cosmetic surgical procedures. Therefore, supporting scars with tape after surgery is critical for reducing scar tension. The aim of this study was to determine the extent of patients' satisfaction with their scar outcomes following microporous taping and to identify the determinants of scar satisfaction.

Methods A prospective randomized controlled study was conducted to compare the scar satisfaction of postsurgical patients who underwent scar taping with microporous tape to those who did not. The scars were assessed at 6 weeks, 3 months, and 6 months after surgery using the Patient Scar Assessment Scale (PSAS). The test group had microporous tape applied to their scars and the tape was worn 24 hours a day for a period of 6 months. The data were analyzed using SPSS version 22.0. Categorical variables and mean PSAS scores were compared using the chi-square test and repeated-measures analysis of variance, respectively.

Results At 6 weeks, 3 months, and 6 months the taped group had significantly lower PSAS scores and higher satisfaction scores than the control group. Scar thickness and pruritus were statistically significant determinants of patient satisfaction.

Conclusions Microporous tape is an effective modality for improving scar satisfaction in postsurgical patients.

Keywords Adhesive surgical tapes / Hypertrophic scars / Patient satisfaction

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perthrophic 6 to 8 weeks following surgery or another injury; thus, scar support with microporous tape is crucial during this period [1]. To reduce excessive fibroblasts, collagen, and production of glycosaminoglycan, a moist environment is required. The use of an adhesive microporous tape that mimics the function of the stratum corneum reduces evaporative water loss and restores homeostasis in the scar [2]. Microporous tape is a dressing tape that was discovered to have scar-modulating effects. It is made up of a conformable, inextensible, nonwoven fabric manufactured from 100% viscose and coated with a layer of acrylic adhesive. It is cheap, cost-effective, readily available, and relatively affordable for postsurgical patients.

Abnormal scarring is a global problem, associated with major financial and emotional burdens. It is estimated that 100 million people acquire scars following surgery every year and approximately 15% have excessive or aesthetically unfavorable scars [3]. Following

cosmetic surgical procedures, abnormal scars can also be a prime source of dissatisfaction [4,5]. A survey showed that 91% of patients who underwent a routine surgical procedure appreciated even small improvements in scarring [6].

While most studies in the developed world have researched the effectiveness of other scar-modulating modalities to improve patient satisfaction with postoperative scars [7,8], few have investigated the use and effect of microporous tapes. Therefore, the aim of this study was to determine patients' satisfaction with scar outcomes following microporous taping as well as identify the determinants of their satisfaction.

METHODS

This study was a prospective randomized controlled study that assessed the extent of postsurgical patient satisfaction with limb scar outcomes. Patients were divided into two groups; one group underwent microporous taping of their postoperative scars and the other group did not (control group). A total of 72 patients with 92 scars were recruited into the study and were followed for 6 months. After attrition, 63 patients with 83 scars completed the study.

The study population included males and females with directly closed surgical limb wounds following surgical procedures such as benign tumor excisions, open reduction and internal fixation (ORIF) of closed fractures, corrective osteotomies, and arthroplasties. The patients' ages ranged from 15 years to 65 years.

The patients were recruited from the plastic surgery and orthopedic surgery outpatient clinics at the time they were being scheduled for open limb surgery. These operations were performed on the extremities with relatively wide incisions and without endoscopic access or manipulation. Consecutive patients were recruited into the study after they had consented. An equal number of ballot papers were pre-labeled with either "scar taping (A)" or "no scar taping (B)," and sealed in an opaque brown envelope from which the recruited patients drew out a paper shortly before their surgery.

Sample size determination

The sample size was calculated using the Cochran formula:

$$N = \frac{Z_{1-\alpha/2}^2 p(1-p)}{d^2}$$

Where:

N = Minimum sample size

$Z_{1-\alpha/2}$ = Standard normal variant (at 5% type I error) = 1.96

p = Expected proportion of the population based on a pilot study = 21%

d = Absolute error or precision = 0.05

$N = (1.96)^2 \times 0.21 \times (1-0.21) / 0.05^2 = 32$ patients

Assuming a 10% attrition rate, the adjusted sample size was 35 patients for each group for a total of 70 patients. Prior to this study,

a mini-pilot study was carried out at the outpatient clinic of another hospital among orthopedic patients who had open limb surgery, and 10 of the 48 patients studied had hypertrophic scars. Thus, the prevalence of hypertrophic scars in the mini-pilot study was 21%. Patients aged 15 to 65 years who were scheduled for open elective limb surgery, including benign tumor excisions, ORIF of closed fractures, corrective osteotomies, and arthroplasties were included in the study after informed consent was obtained. The operations were carried out under local, regional, or general anesthesia, with or without the use of a tourniquet, and performed by a Senior Registrar or a Consultant. The patients excluded from the study were: (1) those with infected postoperative wounds, (2) patients whose wounds were closed secondarily or healed by secondary intention, (3) patients who had previous keloid scars, (4) those with uncontrolled diabetes mellitus or hypertension, and (5) patients with previous idiosyncratic or hypersensitivity reactions to microporous tape.

Most of the surgical incisions were oriented along Langer's lines. The length of the incision was measured before wound closure. Wound closure was done without tension by the researcher and two other Senior Registrars (orthopedics and plastic surgery, respectively). The subcutaneous tissue was closed with Ethicon (polyglactin 910) 2-0 sutures, while the skin was closed with staples or Ethicon (polypropylene) 3-0 sutures (with an atraumatic needle) in simple interrupted fashion with the wound edges everted. All skin sutures or staples were removed 2 weeks after surgery. A detailed explanation was given to the patient in written form.

Protocol-designed pro-forma was used to collect the personal data of the patients, including biodata, type of surgery, and any scar symptoms (itching or pain). The patient questionnaire included an overall appearance rating of the scar and the patient's level of satisfaction with the scar(s) using the Patient Scar Assessment Scale (PSAS). The PSAS was completed by the patient and consisted of six items: pain, pruritus, color, stiffness, the average thickness of the scar edge, and surface irregularities. The total score for each scale ranged from 6 (best, like normal skin) to 60 (worst, scar different from normal skin). Patients scored the overall appearance of the scar from 0 (best, like normal skin) to 10 (worst, scar different from normal skin). The scars were assessed at intervals of 6 weeks, 3 months, and 6 months after surgery in both study groups. At 6 to 8 weeks after injury or surgery the conversion of a normal scar to a hypertrophic scar is apparent [9]. At 3 months after surgery the scar attains its maximum tensile strength, approximately 80% [10]. The scar matures over a period of at least 6 to 18 months [11].

Tape application procedure

After suture or staple removal, the microporous hypoallergenic tape (2-nm pore size 3M Transpore Tape; 3M Health Care, St. Paul, MN, USA) was applied directly over the new scar, worn by the patient 24 hours a day, and renewed every 2 weeks for an overall period of

6 months. The research assistant gently laid the tape over the scar with mild tension along the longitudinal direction after migrating the surrounding skin towards it. The tape was laid so that it overlapped each side of the scar by approximately 0.5 to 1 cm (Fig. 1). The tape was changed every fortnight at the clinic by the research assistant. The patients bathed or showered daily. The patients were given extra tape and they and their caregivers were instructed in tape application while at the clinic in case the tape accidentally peeled off at home.

Patient scar assessment procedure

During follow-up visits at 6 weeks, 3 months, and 6 months, each section of the protocol-designed pro-forma was completed. The morning before an assessment, the patient would remove the tape and wash the scar area with mild soap to remove remnant tape adhesive. The PSAS was then assessed during the follow-up visit with the patient seated in front of a mirror while one of the research assistants asked the questions. The data were analyzed using SPSS



Fig. 1. The application of microporous tape onto a patient’s scar during a follow-up visit.

Table 1. Patient characteristics

| Variable | Tape, No. (%) | | | P-value |
|------------------------------------|---------------|-----------|----------------|---------|
| | Not applied | Applied | Total (n = 63) | |
| Age (yr) | | | | 0.168 |
| < 20 | 2 (6.5) | 3 (9.4) | 5 (7.9) | |
| 21–30 | 6 (19.4) | 8 (25.0) | 14 (22.2) | |
| 31–40 | 4 (12.8) | 7 (21.9) | 11 (17.5) | |
| 41–50 | 6 (19.4) | 6 (18.8) | 12 (19.0) | |
| 51–60 | 6 (19.4) | 2 (6.3) | 8 (12.8) | |
| > 60 | 7 (22.5) | 6 (18.8) | 13 (20.6) | |
| Sex | | | | 0.074 |
| Male | 15 (48.4) | 23 (71.9) | 38 (60.3) | |
| Female | 16 (51.6) | 9 (28.1) | 25 (39.7) | |
| Procedure done | | | | 0.708 |
| ORIF with plate and screws | 13 (41.9) | 14 (43.8) | 27 (42.9) | |
| Intramedullary nailing of fracture | 10 (32.3) | 8 (25.0) | 18 (28.6) | |
| Hemiarthroplasty | 1 (3.2) | 3 (9.4) | 4 (6.3) | |
| Total joint replacement | 1 (3.2) | 2 (6.2) | 3 (4.8) | |
| Osteotomy | 2 (6.5) | 3 (9.4) | 5 (7.8) | |
| Lipoma/sebaceous cyst excision | 1 (3.2) | 1 (3.1) | 2 (3.2) | |
| Ganglion cyst excision | 1 (3.2) | 1 (3.1) | 2 (3.2) | |
| Open reduction of dislocation | 2 (6.5) | 0 | 2 (3.2) | |
| Limb involved | | | | 0.302 |
| Upper limb | 4 (12.5) | 7 (22.6) | 11 (17.4) | |
| Lower limb | 28 (87.5) | 24 (77.4) | 52 (82.6) | |
| Previous history of abnormal scar | | | | 1.000 |
| Yes | 4 (12.9) | 4 (12.5) | 8 (12.7) | |
| No | 27 (87.1) | 28 (87.5) | 55 (87.3) | |

ORIF, open reduction and internal fixation.

version 22.0 (IBM Corp., Armonk, NY, USA). Categorical variables and mean PSAS scores were compared using the chi-square test and repeated-measures analysis of variance, respectively.

Ethical approval

Ethical approval was obtained from the Ethics and Research Committee of the hospital (protocol number ERC/2017/06/27). After reading and understanding the subject information sheet, and having the purpose of the study and the risks and benefits explained, informed consent was obtained. Confidentiality was maintained at every stage of the study. No extra cost was incurred by the patient for participating in the study aside from the usual cost of treatment. Refusal to participate in this study was respected with no attempt at coercion or inducement. The patients were allowed to exit the study at will without negative consequences to their treatment. The Declaration of Helsinki was strictly adhered to.

RESULTS

A total of 72 patients with 92 scars were recruited, but only 63 patients with 83 scars completed the study. The mean age of the patients was 42.10 ± 15.49 years. Thirteen of the patients (20.6%) were older than 60 years while only five (7.9%) were younger than 20 years. The largest age bracket was 21–30 years (n = 14, 22.2%). There were more males (n = 38, 60.3%) than females (n = 25, 39.7%), and both were well distributed between the taped group and the control group. ORIF of fractures with plate and screws was the most common procedure (42.9%), followed by ORIF with intramedullary nailing (28.6%). Most scars (82.6%) were located on the lower limb. The distribution of scars between the upper and lower limbs was similar, with no significant statistical difference. Only 12.7% of the patients had a history of abnormal scarring, which was not statistically significant (Table 1).

At 6 weeks, 30 scars (71.4%) were rated by patients as good in the taped group, while in the control group only 14 scars (34.2%) were rated good. At 3 months, 24 scars (57.1%) were rated by pa-

tients as good in the taped group, while in the control group only 12 scars (29.3%) were rated good. At 6 months, 24 scars (57.1%) were rated by patients as good in the taped group, while in the control group only 12 scars (29.3%) were rated good. All these differences were statistically significant, with P-values < 0.0001 (Table 2).

Repeated-measures analysis of variance with the Greenhouse-Geisser correction determined that the mean overall PSAS score differed significantly between scar assessment intervals (F = 9.449, df [1.845, 149.409]; P < 0.0001). *Post hoc* analysis with the Bonferroni adjustment revealed that patients' scar scores were not significantly different between 6 weeks and 3 months (mean difference, 0.141; 95% CI, -0.500 to 0.331; P = 0.226) but decreased significant-

Table 2. Ratings by patients of overall scar appearance

| Variable | Tape, No. (%) | | | P-value |
|-------------|---------------|-----------|----------------|----------|
| | Not applied | Applied | Total (n = 83) | |
| 6 Weeks | | | | < 0.0001 |
| Very good | 1 (2.4) | 12 (28.6) | 13 (15.7) | |
| Good | 14 (34.2) | 30 (71.4) | 44 (53.0) | |
| Indifferent | 26 (63.4) | 0 | 26 (31.3) | |
| Poor | 0 | 0 | 0 | |
| Very poor | 0 | 0 | 0 | |
| 3 Months | | | | < 0.0001 |
| Very good | 1 (2.4) | 18 (42.9) | 19 (22.9) | |
| Good | 12 (29.3) | 24 (57.1) | 36 (43.4) | |
| Indifferent | 24 (58.6) | 0 | 24 (28.9) | |
| Poor | 3 (7.3) | 0 | 3 (3.6) | |
| Very poor | 1 (2.4) | 0 | 1 (1.2) | |
| 6 Months | | | | < 0.0001 |
| Very good | 1 (2.4) | 18 (42.9) | 19 (22.9) | |
| Good | 12 (29.3) | 24 (57.1) | 36 (43.4) | |
| Indifferent | 24 (58.5) | 0 | 24 (28.9) | |
| Poor | 4 (9.8) | 0 | 4 (4.8) | |
| Very poor | 0 | 0 | 0 | |

Table 3. Summary of the repeated-measures analysis of variance of Patient Scar Assessment Scale (PSAS) scores

| Variable | Tape group | Control group | Overall patient scar score ^{a)} | | | PSAS score ^{b)} | | |
|---|---------------|---------------|--|---------|----------------|--------------------------|--------------------|--------------------|
| | | | F | P-value | η ² | 1 vs. 2 P-value | 1 vs. 3 P-value | 2 vs. 3 P-value |
| Overall patient scar score at 6 weeks (PSAS score 1) | 1.857 ± 0.566 | 3.073 ± 0.787 | 9.449 | 0.0001 | 0.104 | 0.226 | < 0.0001 | 0.029 |
| Overall patient scar score at 3 months (PSAS score 2) | 1.381 ± 0.491 | 3.268 ± 1.096 | | | | | | |
| Overall patient scar score at 6 months (PSAS score 3) | 1.571 ± 0.500 | 2.756 ± 0.662 | | | | | | |

Values are presented as mean ± SD.

^{a)}Analysis of variance; ^{b)}*Post hoc* analyses.

ly between 6 weeks and 6 months (mean difference, 0.301; 95% CI, 0.134 to 0.469; $P < 0.0001$) and also decreased significantly between 3 months and 6 months (mean difference, 0.161; 95% CI, 0.013 to 0.309; $P = 0.029$) (Table 3).

At 6 weeks, 18 patients (44.0%) were satisfied with their scars in the control group, while 26 patients (61.9%) in the taped group were satisfied. At 3 months, 16 (39.0%) patients in the control group were satisfied with their scars, while 22 (52.4%) in the taped group were satisfied with their scars. At 6 months, one patient (2.4%) was very satisfied and 16 (39.0%) were satisfied with their scars in the control group, while in the taped group 20 patients (47.6%) were very satisfied and 21 (50.0%) were satisfied with their scars. All these differences were statistically significant, with P -values < 0.0001 (Table 4).

The statistically significant scar parameters contributing to patient satisfaction in the multinomial logistic regression model were scar pruritus and scar thickness (Table 5). The parameter estimates for the reduced model, contrasting the neutral and dissatisfied groups with the satisfied group, showed that for each 1 standard deviation

Table 4. Patients' satisfaction with scar outcomes

| Variable | Tape, No. (%) | | | P-value |
|----------------|---------------|-----------|--------------|---------|
| | Not applied | Applied | Total (n=83) | |
| 6 Weeks | | | | <0.0001 |
| Very satisfied | 1 (2.4) | 10 (23.8) | 11 (13.3) | |
| Satisfied | 18 (44.0) | 26 (61.9) | 44 (53.0) | |
| Neutral | 21 (51.2) | 6 (14.3) | 27 (32.5) | |
| Dissatisfied | 1 (2.4) | 0 | 1 (1.2) | |
| 3 Months | | | | <0.0001 |
| Very satisfied | 1 (2.4) | 19 (45.2) | 20 (24.1) | |
| Satisfied | 16 (39.0) | 22 (52.4) | 38 (45.8) | |
| Neutral | 20 (48.8) | 1 (2.4) | 21 (25.3) | |
| Dissatisfied | 4 (9.8) | 0 | 4 (4.8) | |
| 6 Months | | | | <0.0001 |
| Very satisfied | 1 (2.4) | 20 (47.6) | 21 (25.3) | |
| Satisfied | 16 (39.0) | 21 (50.0) | 37 (44.6) | |
| Neutral | 20 (48.8) | 1 (2.4) | 21 (25.3) | |
| Dissatisfied | 4 (9.8) | 0 | 4 (4.8) | |

Table 5. Predictors of patients' satisfaction in multinomial logistic regression

| Predictor | χ^2 | df | P-value |
|---------------------|----------|----|---------|
| Scar pruritus | 10.756 | 2 | 0.005 |
| Scar pain | 1.202 | 2 | 0.548 |
| Scar color | 0.969 | 2 | 0.616 |
| Scar stiffness | 3.286 | 2 | 0.193 |
| Scar thickness | 30.042 | 2 | <0.0001 |
| Scar irregularities | 0.218 | 2 | 0.897 |

increase in scar thickness, the odds of being in the neutral group rather than the satisfied group were 28.147 times higher, with a P -value < 0.0001 . For each 1 standard deviation increase in scar thickness, the odds of being in the dissatisfied group rather than the satisfied group were 42.911 times higher, with a P -value < 0.0001 (Table 6).

Fig. 1 shows the application of tape onto the scar of a patient during a clinic visit. Fig. 2 shows the scar of a patient in the microporous tape group at 6 months, while Fig. 3 shows the scar of another patient in the control group, also at 6 months. The patient in the microporous tape group had a normal scar (Fig. 2), while the patient in the control group had a hypertrophic scar (Fig. 3).

DISCUSSION

Microporous tape is a dressing tape that has scar-modulating effects. It is permeable to both water and water vapor and allows the passage of sweat and secretions from the surface of the body to the environment, preventing maceration of the skin and bacterial growth. Another effective method, which has been demonstrated objec-

Table 6. Parameter estimates for the reduced model contrasting each of the other groups with the satisfied group

| Predictor variable | Multinomial logistic model | | |
|----------------------------|----------------------------|---------|------------|
| | B | P-value | Odds ratio |
| Neutral vs. satisfied | | | |
| Scar pruritus | -0.572 | 0.482 | 0.564 |
| Scar thickness | 3.337 | <0.0001 | 28.147 |
| Dissatisfied vs. satisfied | | | |
| Scar pruritus | 1.869 | 0.088 | 6.480 |
| Scar thickness | 3.759 | <0.0001 | 42.911 |



Fig. 2. Normal scar on a patient's thigh in the taped group at 6 months.



Fig. 3. Hypertrophic scar on a patient's thigh in the control group at 6 months.

tively in many previous studies, is the use of silicone sheets or gel [7,11]. Westra et al. [12], in a prospective multicenter study, found that there was a significant improvement in the color, thickness, and elasticity of hypertrophic scars and keloids following the application of a topical silicone sheet. A systematic review of six randomized controlled trials by Wang et al. [13] showed that topical silicone gel reduced the pigmentation, height, and pliability scores of scars postoperatively when compared with placebos or no treatment, and that topical silicone gel and silicone sheets were comparably effective. An animal study by Tollefson et al. [2] demonstrated that microporous tape and silicone sheets have equal effectiveness in the prevention of hypertrophic scarring. A similar clinical study by Lin et al. [14] also found no significant difference between the two methods at postoperative follow-up, according to Vancouver Scar Scale scores. In contrast to microporous tapes, the silicone sheet produces anhidrosis within 6 days of occlusion, which requires 3 weeks for reversal. The anhidrosis may be due to occlusion of the eccrine duct or secretory coil of the sweat gland [15]. The benefits of microporous taping that have been described in the literature include minimized hypertrophic scars in surgically closed linear wounds [16] and improved scar appearance and scar perception by patients [17].

Clinical experience has also shown microporous tape to be one of the most reliable ways to support a scar [1]. Microporous tape reduces evaporative water loss, thus hydrating the scar and shortening the period until scar maturation [2]. It has also been suggested that its action may be partly mechanical (analogous to pressure therapy) [18] and partly occlusive (analogous to silicone gel therapy) [7]. It may also act by preventing an exacerbation of the inflam-

matory response during wound healing, allowing the more stable, closely woven type I fibers to form covalent bonds and create a cross-linking pattern more comparable to normal skin. There is no absolute contraindication to microporous taping. However, it should be used with caution on patients who have fragile skin such as those on long-term steroid therapy. In addition, it should not be applied under tension to avoid shearing-force damage to the skin. Adverse reactions to microporous taping include a stinging sensation, skin erythema, and pruritus [2].

In a previous study, patient compliance was found to be a problem because they were instructed to change the tape daily for a period of months [19]. Widgerow et al. [1] found out that it is unnecessary and counterproductive for the patient to remove the tape daily. The tape should be left in place until spontaneous separation occurs (usually 7–10 days). In this study, compliance with the application of microporous tape was good. Most patients removed their tape after 10 days before reapplying another; some removed it as early as 5–7 days, while a few left the tape on for 14 days before changing it. This observation is in line with the experience of Widgerow et al. [1]. Only two patients in the treatment group reacted to the microporous tape and could not complete our study. Both reactions manifested as erythema of the skin beneath the tape and rashes along the incision line. The reactions resolved spontaneously after 3 and 5 days of removing the tapes, respectively.

The patient population in this study showed a slight male predominance (60.3%), which is comparable to previous studies [20,21]. In contrast, a similar randomized control trial by Atkinson et al. [22] in Australia was done only among women who had cesarean sections. The overall scar rating given by the patients was significantly better in the intervention group. At 6 weeks, all taped scars (100%) and almost two-fifths (36.6%) of scars in the control group were rated as good or very good, whereas none of the taped scars and more than half (63.4%) of controls were rated as indifferent. None of the scars were rated as poor at 6 weeks. At 3 months, all (100%) of the taped scars and one-third (31.7%) of the control scars were rated as good or very good, whereas more than half (58.6%) and very few (9.7%) of the control scars were rated as indifferent and poor/very poor, respectively. At 6 months, all (100%) of the taped scars and one-third (31.7%) of the control scars were rated as good or very good, whereas more than half (58.5%) and very few (9.8%) of the control scars were rated as indifferent and poor, respectively. This is comparable to the results from the study by Rosengren et al. [21] where approximately two-thirds of scars (64.4%) were rated as good or very good in the taped participants and more than one-third (38.4%) received good or very good ratings in the controls, whereas the scars were rated as poor or very poor in some (14.6%) taped participants and more than one-third (39.8%) of controls.

In this study, there was a statistically significant difference in patients' satisfaction between the microporous taped group and the

control. Rosengren et al. [21], however, observed that although the patients' satisfaction was high, they were unable to prove statistically that taping affected patients' satisfaction. Brown et al. [23] showed that patients were more content with their scars than the observers were, possibly as a result of patients' acceptance or adaptation to their appearance. In a multivariate analysis by Consorti et al. [24], pain, color, and thickness were the significant contributing factors to patients' satisfaction. In the current study, scar thickness and scar pruritus were the significant determining factors of patient satisfaction. It is noteworthy that the factors identified in this study are directly related to both aesthetic and non-aesthetic outcomes of the scar. Other factors that possibly contribute to patients' satisfaction with their postoperative scars include cultural context, individual patient factors, and the quality of preoperative counseling given to patients and their families about possible scar outcomes [24].

The overall patient scores for the microporous tape group were also more favorable, with a mean rank score of 27.66, 25.27, and 24.50 at 6 weeks, 3 months, and 6 months, respectively, versus 61.21, 62.88, and 59.93 for the control group. This difference was statistically significant ($P < 0.0001$). The mean of the overall patient scores at 6 weeks, 3 months, and 6 months were 1.86, 1.39, and 1.33 in the microporous tape group and 3.11, 3.27, and 3.37 in the control group, respectively. This is similar to that obtained by Consorti et al. [24] among patients who had neck incisions for thyroidectomy. The mean overall patient scores in his study were 1.65 and 2.17 in the test and control groups, respectively, which are slightly higher than the values in this study.

In this study, pain was of minor importance to the patients compared with other scar characteristics.

For other scar characteristics (color, stiffness, irregularity, and thickness), approximately one-tenth to two-fifths (9.3% to 37.2%) of scars at 6 weeks, one-third to two-thirds (30.2% to 69.8%) at 3 months, and two-fifths to four-fifths (40.5% to 83.3%) at 6 months were similar to normal skin according to patients in the taped group as opposed to none to one-twentieth (0.0% to 4.3%) of scars at 6 weeks, none to almost one-tenth (0.0% to 6.7%) at 3 months, and one-twentieth to one-tenth (4.9% to 9.8%) in the control group. In the study by Frans et al. [25], however, approximately one-fifth to two-fifths (20% to 40%) of the scars had characteristics (color, pliability, irregularity, and thickness) that were similar to normal skin, as adjudged by the patients. The outcome in the Frans study [25] is closer to but lower than that of the microporous taped group in this study and further affirms the effectiveness of microporous tapes in improving scar parameters.

The results of this study demonstrated greater patient satisfaction in the taped group following upper and lower limb surgery. It is recommended that all postsurgical patients, irrespective of their risk of developing hypertrophic or stretched scars, should have their scars supported with microporous tape for at least 6 months to im-

prove their scar satisfaction.

The significance of this study was that it demonstrated the efficacy of microporous taping in improving patients' scar satisfaction among a brown- and black-skinned population. The results of this study showed lowered PSAS scores, which also suggests that the prophylactic use of microporous tape on postsurgical scars, irrespective of the risk of abnormal scarring, would be worthwhile. The limitation of this study was that only the patients' scar assessment scores were utilized to determine their scar satisfaction. Other factors such as the cultural context of individual patients and the type of preoperative counseling provided were not considered in this study, but may have influenced patients' level of scar satisfaction.

NOTES

Conflict of interest

No potential conflict of interest relevant to this article was reported.

Ethical approval

The study was approved by the Ethics and Research Committee of the Obafemi Awolowo University Teaching Hospital (OAUTH) Ile-Ife (protocol number: ERC/2017/06/27) and performed in accordance with the principles of the Declaration of Helsinki.

Patient consent

The patients provided written informed consent for the publication and use of their images.

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