*J Wound Ostomy Continence Nurs.* 2015;42(2):145-150.
Published by Lippincott Williams & Wilkins

WOUND CARE

# *The Effect of 2 Adhesive Products on Skin Integrity Used for Fixation of Hip and Knee Surgical Dressings*

## *A Randomized Controlled Trial*

Nergiz Ter ■ Meryem Yavuz ■ Semih Aydoğdu ■ Elcil Kaya Biçer

## ABSTRACT

**PURPOSE:** The aim of this study was to compare effects of 2 adhesive products, a nonwoven porous adhesive bandage (NPAB) and transparent film adhesive bandage (TFAB), on skin integrity for fixation of hip and knee surgical dressings.

**MATERIALS AND METHODS:** A prospective, randomized study was conducted on 300 patients who underwent hip and knee surgery (arthroplasty, fixation of fractures, tumor operations, etc). Participants were randomized into 2 equal groups according to the applied surgical dressing fixation product (NPAB or TFAB). Skin changes (edema, erythema, blister, peeling of blister, mechanical peeling, and maceration), drying of incision, serous discharge, and early infection symptoms were evaluated.

**RESULTS:** The skin integrity was found to be impaired in 4.0% (n = 6) of the 150 NPAB patients and in 10.7% (n = 16) of the 150 TFAB patients ($P = .02$). Logistic regression analysis showed that the risk of impaired skin integrity increased 2.5-fold when TFAB was applied ($P = .03$).

**CONCLUSION:** The NPAB was associated with a reduced likelihood of impaired skin integrity following hip and knee surgery.

**KEY WORDS:** medical adhesive-related skin injury, nonwoven porous adhesive bandages, surgical wound dressings, transparent film adhesive bandages

## Introduction

Approximately 234 million surgical interventions are performed in the world each year; the incisional wounds created by these procedures usually heal without secondary infection or other complications provided adequate wound care is undertaken following surgery.[1] The selection and form of application of a surgical wound dressing are an important consideration when managing a surgical site incision.[2,3]

Dressings used for hip and knee surgery are typically fixed to the skin via an adhesive. Natural rubber latex-based, acrylate, silicone, hydrocolloids, hydrogels, and polyurethane are commonly used medical adhesives.[4] Skin integrity can be impaired due to the adhesive wound dressing fixation materials. Impaired skin integrity due to adhesives has been identified as a major clinical problem following hip and knee surgery over the past 15 years.[5,6] Mobility of the affected joints following hip and knee surgery leads to friction forces between the adhesive dressing fixation materials and the skin overlying the connective tissue, predisposing to formation of blisters.[3,4,7-9] Application also may create tension and compromise local capillary circulation that also leads to the formation of blisters.[3,4,6,7,10,11] Additional factors predisposing patients to medical adhesive-related skin injury (MARSI) include comorbid conditions, associated impaired skin integrity, medications such as insulin and corticosteroids, surgical skin preparation solutions, the duration of the retraction of the wound throughout the surgery, soft tissue edema that develops following the surgery, use of nonelastic adhesive dressings, and the mobility of the application region.[6,7,9,12] The rate of blister formation because of the adhesive fixation products following hip and knee operations varies from 29% to 91%.[3,8,13,14]

■ **Nergiz Ter, PhD,** Quality Unit, Ege University Faculty of Medicine Hospital, Izmir, Turkey.
■ **Meryem Yavuz, PhD,** Department of Surgical Diseases Nursing, Ege University Faculty of Nursing, Izmir, Turkey.
■ **Semih Aydoğdu, MD,** Department of Orthopedics and Traumatology, Ege University Faculty of Medicine, Izmir, Turkey.
■ **Elcil Kaya Biçer, MD,** Department of Orthopedics and Traumatology, Ege University Faculty of Medicine Hospital, Izmir, Turkey.

The authors declare no conflict of interest.

**Correspondence:** Nergiz Ter, PhD, Quality Unit, Ege University Faculty of Medicine Hospital, Izmir, Turkey (nergiz.ter@ege.edu.tr).

DOI: 10.1097/WON.0000000000000112

Adhesive bandage removal may lead to impairment of the skin's moisture barrier, severe pain, infection, and extension of the hospitalization period. It may also exert a negative effect on wound healing, increase costs, and diminish quality of life.[2,7,10,11,14-16]

In our practice, the nonwoven porous adhesive bandage (NPAB) is one of the commonly used adhesive dressings for fixation following surgery of the hip or knee. The adhesive substance within this product is acrylic, which is backed with a porous, nonwoven polyester fiber.[17] We prefer to use this type of adhesive bandage because we find it hypoallergenic and flexible, thus easing application. It was thought that transparent films in rolls could be used as an alternative adhesive product in the fixation of hip and knee surgical dressings. Transparent films are formed from polyurethane with an acrylic adhesive. They also contain low amounts of acrylic to prevent chemical-related skin damage. The water-repellent nature of the transparent film dressings prevents bacterial contamination across the dressing surface. However, they have high vapor permeability and permit oxygenation of the skin. This design feature is intended to prevent the accumulation of liquids and perspiration under the dressing. The elasticity of the product tends to increase patient comfort.[17,18] This is an important design feature because rigid products have been reported to cause MARSI especially in case of tissue edema, which was commonly observed postoperatively.[4]

The aim of this prospective, randomized controlled trial was to compare the occurrence rate of MARSI in 2 groups of patients using a NPAB or transparent film adhesive bandage (TFAB) for fixation of hip and knee surgical dressings. The secondary aims included determination of the influence of age, body mass index (BMI), presence of allergies, and cigarette smoking on development of MARSI in the 2 groups.

## Methods

A prospective, randomized trial was conducted on 300 patients who underwent major hip or knee surgery (Table 1). Two hundred participants were female and 100 were male. Since gender was an independent variable, randomization was performed separately in male and female patient groups. Participants were randomized as follows: starting from the beginning date of the study, for the odd numbered weeks (1, 3, 5, 7…) of the year, the NPAB were applied, and for the even numbered weeks (2, 4, 6, 8…), the TFAB were applied over a dry gauze cloth for the dressings of the patients included in this study. Study procedures were reviewed and approved by the Izmir Clinical Research Ethics Committee. Written and verbal informed consents were obtained preoperatively. The planned incision site of the patients was examined preoperatively and patients with prior wounds in these sites were excluded.

Prior to study enrollment, 8 resident physicians who were responsible for applying wound dressings were informed about the dressing protocol, the adhesive fixation products, and the evaluation criteria of subjects. A demographic and information form was completed during pre- and perioperative data collection periods by the researchers. The form queried factors thought to influence the likelihood of developing MARSI, including age, BMI, cigarette smoking, preexisting chronic diseases, allergies, reason for operation, type of operation, and characteristics of the skin at the incision site (dryness, thinness, redness, scabs). During the perioperative period, the form queried type of preoperative skin preparation used, the side of the extremity either right or left, the incision site, duration of the operation, as well as tourniquet use and its duration.

A dressing protocol was developed (Table 2). After skin closure, the incision site was cleansed with a saline solution and the appropriate adhesive bandage was used to fix the dressing based on random allocation described earlier. Care was taken to standardize the position of the extremity and direction of the bandages during application. The dressings were applied by resident doctors in the operating theatre. Dressing changes on the ward also were completed by resident physicians. Dressing remained in place for 48 hours postoperatively. Subsequent dressing changes occurred every 48 to 72 hours, at the 3rd and 5th postoperative day,

**TABLE 1.**

**Distribution According to Adhesive Fixation Products for the Types of Operations of the Patients**

| Type of Operation | Adhesive Fixation Product | | | | | |
|---|---|---|---|---|---|---|
| | Nonwoven Porous Adhesive Bandage | | Transparent Film Adhesive Bandage | | Total | |
| | N | % | N | % | N | % |
| Total knee prosthesis | 55 | 36.7 | 59 | 59.3 | 114 | 38.0 |
| Endoprosthesis | 37 | 24.7 | 34 | 24.7 | 74 | 24.7 |
| Total hip prosthesis | 20 | 13.3 | 18 | 12.0 | 38 | 12.7 |
| Other | 38 | 25.3 | 36 | 24 | 74 | 24.6 |
| Total | 150 | 100 | 150 | 100 | 300 | 100 |

**TABLE 2.**
**Dressing Protocol**

| | |
|---|---|
| Preoperative evaluation | Evaluation of the potential risk factors for wound problems |
| | Evaluation of the tissue integrity of incision area preoperatively |
| Key points in application of wound dressing | The fixation of dressings should be parallel to the incision |
| | The dressings of the knee region should be applied in flexion position |
| Removal of wound dressing | The fixation product should be removed by pulling it onto itself parallel to the skin |
| Postoperative evaluation | The dates of dressing changes should be noted |
| | The incision site should be evaluated for medical adhesive related skin injuries |

and prior to hospital discharge. Data collection for an individual subject lasted until his or her hospital discharge.

A Skin Problems Evaluation Form was used to evaluate the skin postoperatively; it was completed by the researchers. It queried the product used to fix the dressing, the number, and frequency of dressing changes prior to hospital discharge. The form was also used to document medical adhesive-related skin injuries such as erythema, blisters, drying of incisional skin, serous leakage, of signs of surgical infection.

### *Data Analysis*

Data analyses were performed using the SPSS v16.00 (Statistical Package for the Social Sciences, SPSS Inc, Chicago, IL). Chi-square test and *t* test were used to compare group demographics and pertinent clinical characteristics. Chi-square and logistic regression analysis were used to compare main study outcomes (medical adhesive–related skin damage) between the 2 groups. The influence of age, BMI, presence of allergies, and cigarette smoking on occurrence of medical adhesive–related skin damage in each group was analyzed utilizing chi-square and Fisher exact tests. The level of significance was set *a priori* at .05.

## Results

The mean ages of the patients in NPAB and TFAB groups were 64.97 ± 17.18 and 64.69 ± 17.18 years, respectively ($P$ = .88). The groups were based on BMIs, preoperative serum albumin levels, presence of a chronic disease, and smoking habits (Table 3). The mean value of BMI of the patients in the NPAB group was 27.78 ± 5.03 kg/m² and it was 28.03 ± 5.40 kg/m² for the patients in the TFAB group ($P$ = .88). The mean preoperative serum albumin levels in both groups were 43.38 ± 5.03 g/dL ($P$ = .58). In the NPAB group 54.7% (82 out of 150) of the patients and in the TFAB group 54% (81 out of 150) of the patients had a chronic disease ($\chi^2$ = 0.01, $F$(Fisher's) = 1, $P$ = .90); 19.3% of the patients (29 out of 150) in the NBAP group and 17.3% (26 out of 150) patients in the TFAB group had diabetes mellitus ($\chi^2$ = 0.20, $F$(Fisher's) = 0.76, $P$ = .65). In the NBAP group, 63.3% of the patients never smoked a cigarette; 24% of them quit smoking, and 12.7% of them were still smokers. In the TBAP group, these ratios were 62.7%, 25.3%, and 12%, respectively ($\chi^2$ = 0.01, $P$ = .90).

**TABLE 3.**
**Demographic and Pertinent Characteristics of the Patients**

| | NPAB | TFAB | *P* |
|---|---|---|---|
| Sex | | | |
| Female, n | 100 | 100 | |
| Male, n | 50 | 50 | |
| Age | | | |
| Mean ± SD | 64.97 ± 17.18 | 64.69 ± 17.18 | .88 |
| Range | 18-99 | 18-92 | |
| BMI | | | |
| Mean ± SD, kg/m² | 27.78 ± 5.03 | 28.03 ± 5.40 | .88 |
| Range, kg/m² | 17.50-48.44 | 16.85-43.21 | |
| Serum albumin level | | | |
| Mean ± SD, g/dL | 43.35 ± 5.03 | 43.38 ± 5.03 | .58 |
| Range, g/dL | 23-52 | 24-54 | |
| Preexisting chronic disease | | | |
| Yes, n (%) | 82 (54.7%) | 81 (54.0%) | .90 |
| No, n (%) | 68 (45.3%) | 69 (46%) | |
| History of diabetes | | | |
| Yes, n (%) | 29 (19.3%) | 16 (17.3%) | .65 |
| No, n (%) | 121 (80.7%) | 124 (82.7%) | |
| History of allergic disease | | | |
| Yes, n (%) | 28 (18.7%) | 30 (20.0%) | .77 |
| No, n (%) | 122 (81.3%) | 120 (80%) | |
| Smoking habit | | | |
| Nonsmokers, n (%) | 95 (63.3%) | 94 (62.7%) | .96 |
| Quitters, n (%) | 36 (24.0%) | 38 (25.3%) | |
| Smokers, n (%) | 19 (12.7%) | 18 (12%) | |

Nonwoven porous adhesive bandages were applied to the hip region of 67 patients (44.7%), upper thigh of 18 (12.0%), and knee of 65 (43.3%). Transparent film adhesive bandages were applied to 65 patients' hip (43.3%), 18 patients' upper thigh (12.0%), and 67 patients' knee dressings (44.7%), respectively. Groups did not vary based on preoperative skin preparation used, duration of the operation, tourniquet use, and its duration (Table 4).

### *Medical Adhesive-Related Skin Injury Outcomes*

Medical adhesive–related skin damage was observed in 22 (7.3%) of the sample. Skin damage occurred in 4.0% (n = 6) of the 150 patients in the NPAB group and in 10.7%

**TABLE 4.**
**Comparison of Characteristics Related to the Operation**

| | NPAB, n (%) | TFAB, n (%) | Total, n (%) | *P* |
|---|---|---|---|---|
| Skin preparation solution | | | | |
| Povidone-iodine | 94 (62.7) | 104 (69.3) | 198 (66.0) | .22 |
| Alcohol-iodine | 56 (37.3) | 45 (30.7) | 102 (34.0) | |
| Total n (%) | 150 (100) | 150 (100) | 300 (100) | |
| Duration of operation | | | | |
| 1-2 h | 74 (49.3) | 67 (44.7) | 141 (47.0) | .14 |
| 2-3 h | 53 (35.3) | 68 (45.3) | 121 (40.3) | |
| 3-4 h | 23 (15.3) | 15 (10.0) | 38 (12.7) | |
| Total, n (%) | 150 (100) | 150 (150) | 300 (100) | |
| Tourniquet use | | | | |
| Used | 113 (75.3) | 103 (68.7) | 216 (72.0) | .19 |
| Not used | 37 (24.7) | 47 (31.3) | 84 (28.4) | |
| Total | 150 (100) | 150 (100) | 300 (100) | |
| Duration of tourniquet use | | | | |
| 30 min-1 h | 10 (27.0) | 9 (19.1) | 19 (22.6) | .65 |
| 1-1.5 h | 18 (48.6) | 27 (57.4) | 45 (53.6) | |
| 1.5-2 h | 9 (24.3) | 11 (23.4) | 20 (23.8) | |
| Total, n (%) | 37 (100) | 47 (100) | 84 (100) | |

(n = 16) of the 150 patients in the TFAB group (*P* = .02). Medical adhesive–related skin damage was significantly more common in the TFAB group. Logistic regression analysis revealed that the utilization of TFAB increased the risk of MARSI by 2.5-fold (*P* = .03, Exp β = 2.60).

Other forms of skin problems were observed. They included itching and redness in 27 (9.0%) of the sample population. Eight (5.3%) were in the NPAB group versus 19 (12.7%) in the TFAB group (*P* = .02).

Figure 1 compares skin damage outcomes based on surgical location. Subjects who underwent hip surgery and were managed with TFAB were more likely to experience MARSI than were patients allocated to the NPAB group (13.3% vs 3.5%; *P* = 0.04). However, patients who underwent knee surgery and were managed with TFAB were no more likely to experience skin damage than were subjects managed with NPAB (7.5% vs 4.6%; *P* = .96).

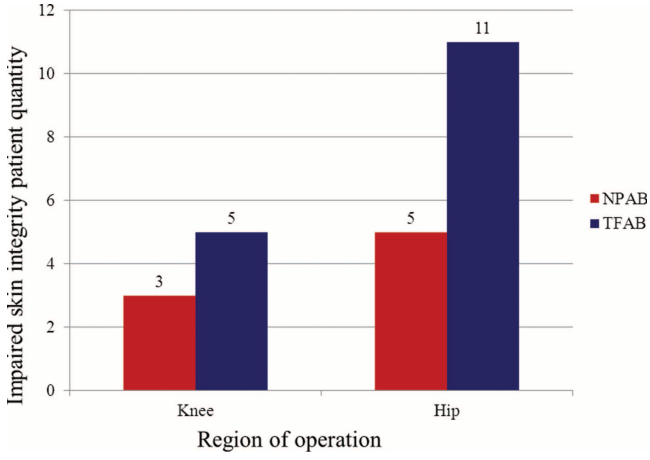


**FIGURE 1.** Impaired skin integrity according to operation site.

The occurrences of skin damage were not statistically significant within or between the two groups based on female gender. In contrast, within-group analysis revealed that more skin problems occurred in male patients in the TFAB group (*P* = .05). Age (analyzed as a dichotomous variable; <65 years of age or ≥65 years old), presence of allergies, and cigarette smoking did not influence MARSI occurrence rates (*P* values in the NPAB group .76, .63, and .99, respectively; the TFAB group .76, .90, and .17, respectively). We analyzed patients based on BMI (analyzed as a dichotomous variable <30 vs ≤30). No significant differences were found in either the NPAB or TFAB group (*P* values .389 and .573, respectively). Skin preparation choice (alcohol iodine or povidone-iodine) also did not cause a significant difference in both groups (*P* values the NPAB group: 0.45, the TFAB group: 0.53).

When the sample was analyzed as a whole, participants with diabetes mellitus were not found to have significantly more skin problems that persons without diabetes (8.2% vs 12.7%; *P* = .298). However, differences based on presence of diabetes mellitus were found when subjected were analyzed based on group allocation. Specifically, skin problems occurred in 12.9% (n = 16) of the TFAB group versus 3.3% (n = 4) in the NPAB group (*P* = .01). Skin integrity outcomes were also analyzed based on operative time; no differences were found (*P* = .10).

The frequency and timing of dressing changes were also found to influence the likelihood of medical adhesive–related skin damage. Eleven percent of patients in the TFAB group developed skin damage versus 3.1% of subjects in the NPAB group (*P* = 0.02; Table 5).

**TABLE 5.**

**Distribution According to Adhesive Fixation Products of the Skin Problems Occurring Within the First 48 Hours**

| | Adhesive Fixation Product | | | | | |
|---|---|---|---|---|---|---|
| | Nonwoven Porous Adhesive Bandage | | Transparent Film Adhesive Bandage | | Total | |
| Skin Problems in the First 48 h | N | % | N | % | N | % |
| Blister | 2 | 50.0 | 6 | 40.0 | 8 | 50.0 |
| Peeling of blister | 2 | 50.0 | 2 | 13.3 | 3 | 15.8 |
| Blister and peeling of blister | … | … | 2 | 13.3 | 2 | 10.5 |
| Mechanical peeling | … | … | 3 | 20.0 | 3 | 15.8 |
| Blister and mechanical peeling | … | … | 2 | 13.3 | 2 | 10.5 |
| Total | 4 | 100 | 15 | 100 | 19 | 100 |

## Discussion

The most important criterion for selection of a postoperative dressing for patients undergoing hip or knee surgery is its ability to cover and protect the surgical incision and prevent tissue trauma and when the dressing is changed or removed.[2,19] The overall occurrence rate of MARSI in this group of 300 patients undergoing knee or hip surgery was 7.3%. Others have reported similar occurrence rates. For example, Jester and colleagues[3] reported a 13% incidence of blister formation at surgical incision sites of 169 patients who underwent total knee and hip arthroplasty operations.

The findings of our study demonstrate that a NPAB caused less skin damage when compared to TFAB. Koval and colleagues[6] reported that 41% of 49 patients who used a nonstretch silk tape experienced blisters versus 10% out of 50 patients who used a stretchable cloth tape after hip surgery ($P = .005$). Blaylock and associates[5] hypothesized that postoperative blister formation is related to tissue edema; the tissues underneath nonelastic dressing materials lead to skin damage. However, our results contradict this hypothesis; we found that patients who used a more elastic surgical dressing (TFAB) were 2.5-fold more likely to develop skin damage than were patients who used a nonelastic adhesive dressing (NPAB). We are not certain why subjects managed by the TFAB adhesive dressing were more likely to experience skin damage than were patients who used NPAB.

Our results also demonstrated a higher occurrence of impaired skin integrity after hip versus knee procedures ($P = .04$). Others have suggested that MARSI may be attributable to rubbing between the adhesive dressing fixation products and the soft tissues as the patient moves these reconstructed joints.[3,6,9] This difference may be attributable to inherent differences in the skin over the hip versus the knee, or mechanical factors such as the position of the patient in bed, and the greater likelihood of rubbing and pinching in the hip region versus the knee. Furthermore, the hip joint is located deeper beneath larger muscles that tend to generate greater traction forces during surgery, which may further increase subsequent damage to skin and other soft tissues.

Koval and colleagues[8] found statistically significant differences in the occurrence of medical adhesive–related skin blisters based on surgery type and duration of surgery. The comparison of hip arthroplasty and open reduction and internal fixation showed that arthroplasty increased the risk of blister formation 2.84 times when compared to open reduction and internal fixation. Surgeries that lasted more than 2 hours were associated with 2.4 times increased risk for blister formation when compared to the operations lasting less than 2 hours. We found that hip procedures were associated with an increased likelihood of skin blisters when compared to knee surgery. In contrast, we found that the duration of the surgical procedure did not influence the likelihood of skin blisters. This could be attributed to differences in the dressings used in the 2 studies.

## Limitations

This study compared only 2 types of adhesive bandages. Comparison of the influence of other types of adhesive bandages could be a topic of another study. Although the patients were grouped according to their surgical sites, the operations performed were several, which may have influenced the results. Subjects were observed only during their hospital stay; observation of subjects until sutures are removed from the surgical site is a topic for additional research.

## Conclusions

Skin integrity can be impaired due to the adhesive wound dressing fixation materials. Selection and application of dressing materials are important for the maintenance of skin integrity. We found that a TPAB dressing caused 2.5-fold increases in skin impairment when compared to

NPAB. Surgical site was found to influence the occurrences of skin damage. The hip region was more prone to MARSI than was the knee. Age, BMI, presence of allergies, smoking habits, duration of surgery, and surgical preparation solutions were not found to be related to the occurrence of skin damage. In nondiabetic patient population, utilization of transparent film bandage caused more skin problems. Nonwoven porous adhesive bandage caused fewer skin problems and together with its ease of application and lower cost and it can be proposed as a preferable dressing fixation product after hip and knee surgery.

### ■ ACKNOWLEDGMENT

This research was funded by Ege University scientific research project evaluation committee (Project Number: 2010 TIP 011).

## ■ References

1. Uzunköy A. Surgical site infections: risk factors and methods of prevention. *Turk J Trauma Emerg Surg*. 2005;(11)4;269-277.
2. Baxter H. Management of surgical wounds. *Nurs Times*. 2003;99(13):66-68.
3. Jester R, Russel L, Fell S, Williams S, Prest C. A one hospital study of the effect of wound dressings and other related factors on skin blistering following total hip and knee arthroplasty. *J Orthop Nurs*. 2000;4:71-77.
4. McNichol L, Lund C, Rosen T, Gray M. Medical adhesives and patient safety: State of the science. *J Wound Ostomy Continence Nurs*. 2013;40:365-380.
5. Blaylock B, Murray M, O'Connell K, Rex J. Tape injury in the patient with total hip replacement. *Orthop Nurs*. 1995;14(3):25-28.
6. Koval KJ, Egol KA, Polatsch DB, Baskies MA, Homman JP, Hiebert RN. Tape blisters following hip surgery. A prospective, randomized study of two types of tape. *J Bone Joint Surg Am*. 2003;85-A(10):1884-1887.
7. Hahn GJ, Grant D, Bartke C, McCartin J, Carn RM. Wound complications after hip surgery using a tapeless compressive support. *Orthop Nurs*. 1999;18(3):43-49.
8. Koval KJ, Egol KA, Hiebert R, Spratt KF. Tape blisters after hip surgery: can they be eliminated completely? *Am J Orthop (Belle Mead NJ)*. 2007;36(5):261-265.
9. Ravenscroft MJ, Harker J, Buch KA. A prospective, randomised, controlled trial comparing wound dressings used in hip and knee surgery: Aquacel and Tegaderm versus Cutiplast. *Ann R Coll Surg Engl*. 2006;88(1):18-22.
10. Lawrentschuk N, Falkenberg MP, Pirpiris M. Wound blister post hip surgery: a prospective trial comparing dressings. *ANZ J Surg*. 2002;72(10):716-719.
11. Pukki T, Tikkanen M, Halonen S. Assessing Mepilex border in post-operative wound care. *Wounds UK*. 2010;6(1):30-40.
12. Collier M, Hollinworth H. Pain and tissue trauma during dressing change. *Nurs Stand*. 2000;14(40):71-73.
13. Milne TC, Barrere CC, McLaughlin T, Moore A. Surgical hip dressings: a comparison of taping methods. *Orthop Nurs*. 1999;18(3):37-42.
14. Harle S, Kirhonen A, Kettunen JA, Seitsalos S. A randomized clinical trial of two different wound dressing materials for hip replacement patients. *J Orthop Nurs*. 2005;9:205-210.
15. Leal A, Kirby P. Blister formation on primary wound closure sites: a comparison of two dressings. *Wounds UK*. 2008;4(2):31-37.
16. Cutting KF. Impact of adhesive surgical tape and wound dressings on the skin, with reference to skin stripping. *J Wound Care*. 2008;17(4):157-162.
17. Wound Care Product Guide. http://www.mhcwoundcare.com/downloads/full line brochure.pdf. Accessed July 22, 2013.
18. Altay P, Başal G. Wound dressing. *Electron J Text Technol*. 2010;4(1):109-121.
19. Bhattacharyya M, Bradley H, Holder S, Gerber B. A prospective clinical audit of patient dressing choice for post-op arthroscopy wounds. *Wounds UK*. 2005;1(1):30-34.