

Surgical Dressing Cosmesis in the Immediate Postoperative Setting: A Crowdsourcing-based Study

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Background: Postoperative dressings expedite wound healing and decrease the rate of infection. Options for wound dressings vary based on cost, time to apply, method of wound healing, and availability at the hospital; however, a significant difference in postoperative complications between each type has not been found. As such, this study evaluates patient cosmetic preferences for various wound dressings as it relates to early postoperative satisfaction.

Methods: A cross-sectional study was conducted using an online crowdsourcing service that connects research studies to participants. The survey asked users to rate images of various wound dressings. Steri-Strips, Dermabond PRINEO (Johnson & Johnson, Ethicon, Inc.), gauze, surgical tape, and metal staples were the materials assessed. The ratings, based on cleanliness, compactness, and aesthetics, culminated in an average cosmetic score for each dressing.

Results: Controlled for demographics, Steri-Strips and staples were the highest rated dressing types by participants and may correlate with increased patient satisfaction in the immediate postoperative period. Gauze was highly rated for aesthetics and cleanliness but averaged lower scores due to dressing bulk. Dermabond and surgical tape had the lowest and second lowest cosmetic score, respectively.

Conclusions: Although cost, availability, and time to apply are common factors surgeons evaluate when picking a dressing, cosmetic preference is another consideration. Allowing the patient to participate in dressing selection may give them more perceived autonomy and increase immediate postoperative satisfaction. Limitations of this study include limited lighting/positioning standardization of dressing photographs. This analysis does not consider opinions on later wound healing or scarring using the chosen material. (*Plast Reconstr Surg Glob Open* 2025; 13:e6414; doi: 10.1097/GOX.0000000000006414; Published online 10 January 2025.)

INTRODUCTION

Appropriate postoperative surgical dressings are crucial in preventing surgical site infection, augmenting wound healing, mitigating bleeding, and absorbing exudates.^{1,2} Ideal dressings help provide optimal environments that allow for clotting and growth factors to facilitate wound closure. Different dressings have specific goals in how they affect wound healing. These include sustaining moisture, promoting self-debridement of nonfunctional tissue, and decreasing bacteria present

within the surgical site. There is a plethora of postoperative dressing options and the many available options can often be overwhelming to physicians who often default to those available in their training environment or hospital system.¹

Steri-Strips are a type of surgical adhesive tape used in wound closure. Strips can range from an eighth of an inch to 1 inch in width, and 3–4 inches in length. The structure of the strips includes a microporous material coated with a noninflammatory skin adhesive as well as longitudinal bands to maintain integrity and strength.³ Steri-Strips approximate wound edges with menial tension to facilitate wound healing. Dermabond (Johnson & Johnson, Ethicon, Inc., NJ) is a liquid skin adhesive formed from 2-octyl cyanoacrylate used to bring together the edges of a wound. Although Dermabond can be used independently,

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it can also be used in conjunction with PRINEO (Johnson & Johnson, Ethicon, Inc., NJ), a polyester mesh that can be placed over the incision to reinforce the placement of the Dermabond adhesive.^{4–6} Dermabond offers a watertight barrier over the incision. Surgical tapes are a broader category, including nonwoven microporous tape, microporous tape, gauze adhesive tape, and transparent polyurethane tape that are often used independently or in conjunction with other dressings such as surgical staples.⁷ Gauze is used to cover intracutaneous suture and to absorb additional bleeding. Metal staples are commonly used for quick skin approximation and easy postoperative skin closure.⁸

Most of the available literature demonstrates no appreciable difference between the type of dressing used with respect to postoperative pain, scarring, acceptance from patients, ease of removal, and rates of skin and soft-tissue infections.^{1,2,9} Because there has been limited research as to which dressings are most effective and due to the myriad of options advertised for wound closure, surgeons often choose a dressing based on patient preference, surgeon preference and comfort, or simply cost.^{1,2}

After a surgical procedure, patients often wait several days to weeks to reveal the underlying closure, and the cosmesis of this closure often takes months to mature. As such, the immediate postoperative dressing is important in determining their perception of the aesthetic nature of the postsurgical outcome. These dressings are what patients will see in the postoperative period, and as such, their appearance, level of pain, amount of exudate associated with the surgical dressing, and the perceived ease of maintaining it are factors that influence postoperative patient satisfaction.^{10,11} In this study, we aimed to determine if there is a cosmetic and functional publicly perceived preference associated with certain commonly used postoperative dressings.

METHODS

This cross-sectional study was performed via a survey that was distributed to random volunteers found via an online crowdsourcing service, Prolific Academic (Prolific). Institutional review board approval was not obtained for this study as all images were available for full use by the public domain. Prolific is an online crowdsourcing service very similar to its competitor, Amazon Mechanical Turk (MTurk). MTurk is a popular platform that has been used in many fields of research, including healthcare. Prolific was developed in 2014 by researchers who were looking to connect researchers with potential research participants and has been shown to have a similar population demographic as MTurk. There have been studies demonstrating that the population of Prolific is demographically very similar to that of the United States. It is made up of participants who are based in the United States, above the age of 18, have no criminal background, and are not pregnant. Participants are compensated based on the number of tasks they complete on the MTurk platform at a rate determined by Prolific.^{12,13}

A survey was created for this study but was not validated before distribution. The survey included demographic

Takeaways

Question: Is there a cosmetic and functional preference associated with certain dressings in the postoperative time period from the patient perspective?

Findings: Steri-Strips and surgical staples are significantly more cosmetically appealing compared with other postoperative wound dressings when assessed by the general public.

Meaning: Patients may be more satisfied with staples, when appropriate, or Steri-Strips in the immediate postoperative period and should be taken into consideration in the plethora of variables used when deciding which dressing to apply to a patient.

questions such as self-reported gender, household income, ethnicity, experience working in healthcare, and education level. It also included multiple images of the Pfannenstiel incision, each with a different surgical dressing—Steri-Strips, Dermabond, surgical tape, gauze, and staples (Fig. 1). The participants were asked to rate how aesthetic, how dirty, and how bulky each of the dressings looked on a scale of 0–100, with 100 being the most cosmetically appealing. The measure of bulkiness was a proxy for the functional score of the dressing, with higher scores implying less functionality. The scores of the 3 ratings for each dressing were averaged to calculate an average cosmetic score.

The data were pooled and stored using Microsoft Excel 2024 (Redmond, WA). MATLAB 2023b (Portola Valley, CA) was used for all descriptive statistics and data analysis. Python v3.7.17 (Beaverton, OR) was used to generate the graphs in Figures 2–4. Analysis of variance (ANOVA) was performed to determine if there were differences in average cosmetic score. The Tukey-Kramer test was used to determine statistical significance, which was determined to be *P* value less than 0.05. A heatmap was created from the ANOVA model to visualize the results in different demographic populations.

RESULTS

There were 1002 valid responses to the survey of 1200 participants (83.5% response rate). The standard formula for sample size calculations determined that, assuming a population proportion of 50%, a sample of 385 is needed for a significance level of a *P* value less than 0.05, a power of 80%, and a margin of error of 5%. Therefore, this study is appropriately powered. Demographics of the study participants are shown in Table 1. Of the participants, 53.3% were men, 57.2% were between the ages of 26 and 45 years, 69.5% were White, and 54.5% had a household income between \$50,000 and \$150,000, and 46.3% had bachelor's degrees.

The dressing with the highest aesthetic score was Steri-Strips, the highest cleanliness score (ie, the least dirty looking) was Steri-Strips, and the highest compactness score (ie, the least bulky) was staples. The dressing with the lowest aesthetic score was Dermabond, the lowest cleanliness score was also Dermabond, and the lowest compactness

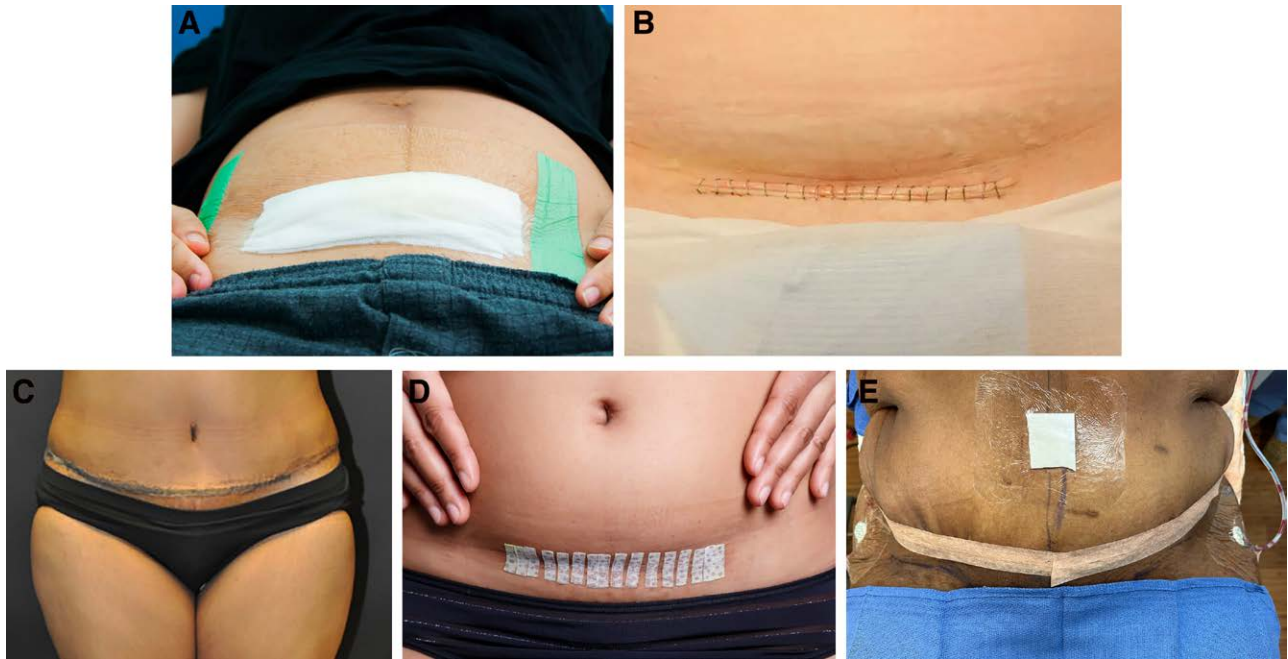


Fig. 1. Images of the types of surgical dressings that were included in the survey. A, Gauze secured with paper tape. B, Staples. C, Dermabond PRINEO. D, Steri-Strips. E, Brown surgical tape.

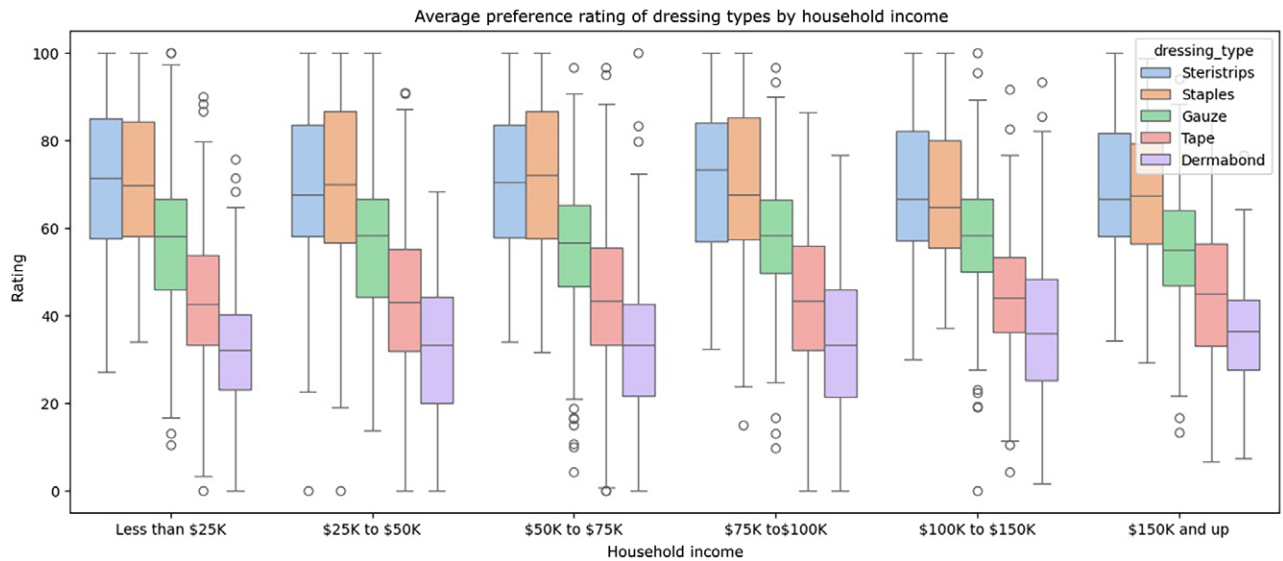


Fig. 2. Box plot illustrating average cosmetic score and interquartile range for each household income.

score was gauze (Table 2). The dressings with the highest average cosmetic scores were Steri-Strips (70.0/100) and staples (69.7/100) (Table 3). An ANOVA model was created that compared each type of dressing with the average score given and had a *P* value of 0, indicating that there is a statistically significant difference between the average scores of each type of dressing. In comparing each dressing individually, it was found that there was a statistically significant difference between all unique pairings of dressings to be compared except for Steri-Strips versus staples (Table 4).

The data were then analyzed based on various demographic factors such as household income, ethnicity, and self-reported gender. (See figure, Supplemental Digital Content 1, which displays a heatmap illustrating the average cosmetic score for each household income, <http://links.lww.com/PRSGO/D742>.) (See figure, Supplemental Digital Content 2, which displays a heatmap illustrating the average cosmetic score for each ethnicity, <http://links.lww.com/PRSGO/D743>.) (See figure, Supplemental Digital Content 3, which displays a heatmap illustrating the average cosmetic score for each gender, <http://links.lww.com/PRSGO/D744>.)

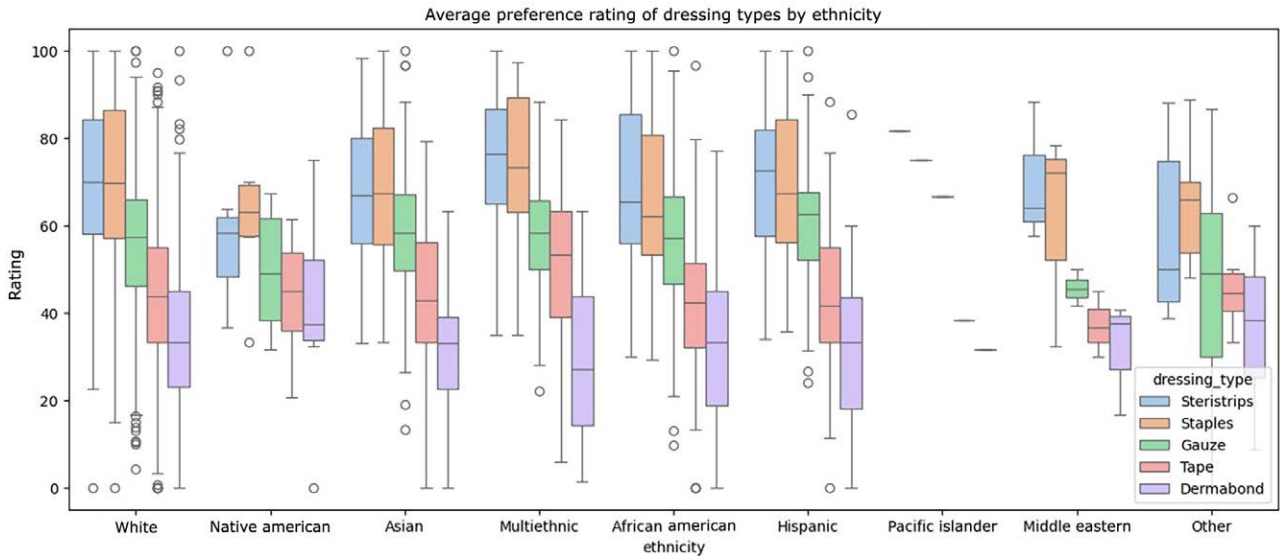


Fig. 3. Box plot illustrating average cosmetic score and interquartile range for each ethnicity.

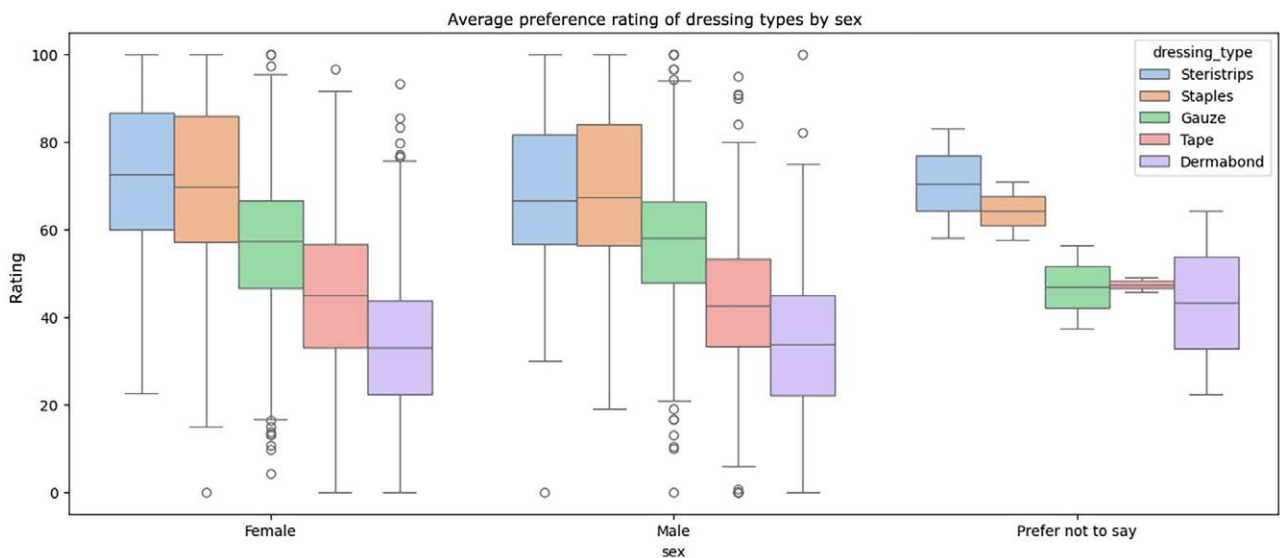


Fig. 4. Box plot illustrating average cosmetic score and interquartile range for each sex/gender.

Darker colors indicate greater popularity among the participants. Overall, there was a consensual favoring of Steri-Strips and staples across all household incomes, genders, and ethnicities (Figs. 2–4).

DISCUSSION

Wound healing has been studied for centuries with the basic tenets of keeping the wound moist, well vascularized, and clean. In a surgical setting, wound healing by primary intention requires different considerations to minimize the appearance of the final scar. Minimizing the final scar necessitates clean, even, uninfected wound margins that are closely approximated and closed by tension-free sutures, staples, or glue.¹⁴ Considerations for wound

dressing include minimizing rates of surgical site infection, tension at the site, and dehiscence. External considerations include cost of the wound dressing, ease of use, as well as time spent using the wound dressing. Due to the plethora of wound dressings on the market, the decision to choose between wound dressings may be decided by evaluating multiple factors, including patient perception of the dressing.

In this study, we evaluated the cosmetic preferences of patients for certain types of wound dressings. However, in reality, the total cost and additional anesthesia time associated with using each dressing is varied and may affect which method is used postoperatively. Gauze is commonly used as it is the lowest cost material, although several dressing changes can be required.^{15–17} Gauze is cost-effective;

however, the additional wound care at home may increase a patient's unease regarding infection and perceived postoperative care. There have been arguments made that more expensive, longer lasting methods such as the Dermabond PRINEO closure system may actually be more cost-effective because less material is used over time and fewer postoperative visits are needed.^{18,19} Dermabond PRINEO has also been shown to take significantly less time to apply

compared with intradermal sutures.⁶ Metal staples are also generally quicker to use in surgery compared with sutures; however, they are more expensive and require removal in an outpatient setting.¹⁸ Staples also have a faster application than Dermabond.¹⁹ Dermabond PRINEO and staples are the most efficient postoperative wound dressing, both of which do not require extensive wound care at home. Steri-Strips have been found to be more cost-effective than staple closure, and like Dermabond PRINEO, require no postoperative material removal.²⁰

Although cost and operating time differ among the various materials, there has been no significant evidence that rate of complications, such as postoperative pain, scarring, and skin and soft-tissue infections vary among surgical dressing types.^{1,2,9} When considering wound dressings, it is important to consider cost, additional operative time, and postsurgical complications.

Greater cosmetic score may correlate with increased patient satisfaction with surgical outcomes. This study found that the general population believes Steri-Strips and staples to be the most cosmetically pleasing postoperative wound dressing compared with Dermabond PRINEO, staples, and gauze. Surprisingly, Dermabond PRINEO received the lowest wound dressing cosmetic score postoperatively, but this is due to Dermabond PRINEO being perceived as the dirtiest wound dressing. This may be a result of the fact that it is a clear adhesive gel with a transparent mesh that does not offer as much of a perceived protective barrier to the incision compared with other dressings. Additionally, gauze received fairly high aesthetic and cleanliness scores but was perceived as the most bulky dressing, which is the reason it had a lower average score. These findings were consistent regardless of patient gender, ethnicity, or household income across all study participants (Figs. 2–4). Despite these significant findings, it may be difficult to influence changes in practice, as many surgeons use postoperative dressings that they are most comfortable with, trained with, and subjectively perceive as superior. The results herein may, however, help steer patient preference and assist in preoperative discussion and curb the patient's postoperative expectations.

Table 1. Survey Participant Demographics

Self-reported gender	
Male	523 (52.2%)
Female	475 (47.5%)
Prefer not to say	2 (0.2%)
Age, y	
18–25	76 (7.5%)
26–45	572 (57.1%)
>46	343 (34.2%)
Ethnicity	
White	686 (69.4%)
African American	105 (10.0%)
Asian	106 (10.6%)
Hispanic	58 (5.8%)
Middle Eastern	3 (0.3%)
Multiethnic	30 (3.0%)
Native American	7 (0.7%)
Pacific Islander	1 (0.1%)
Other	6 (0.6%)
Household income	
< 25,000	143 (14.3%)
25,000–50,000	222 (22.1%)
50,000–75,000	219 (21.9%)
75,000–100,000	175 (17.5%)
100,000–150,000	151 (15.1%)
>150,000	90 (9.0%)
Education level	
Less than high school	9 (8.9%)
High school	375 (37.4%)
Bachelor's degree	464 (46.3%)
Master's degree	121 (12.1%)
Doctoral degree	33 (3.3%)

Table 2. Average Scores for Each Dressing Characteristic

Dressing Type	Mean Aesthetic Score ± SD	Mean Cleanliness Score ± SD	Mean Compactness Score ± SD
Surgical tape	32.8 ± 23.1	41.8 ± 26.6	57.1 ± 27.7
Steri-Strips	69.2 ± 21.3	69.3 ± 28.1	71.5 ± 27.5
Dermabond	18.1 ± 20.2	28.0 ± 28.7	54.4 ± 29.0
Staples	64.8 ± 25.1	69.1 ± 30.0	75.3 ± 28.3
Gauze	68.8 ± 22.7	73.1 ± 31.7	25.7 ± 23.6

Scores approaching 0 are characteristics that are viewed negatively, and scores approaching 100 are characteristics that are viewed positively.

Table 3. Average Scores and Confidence Intervals for Each Type of Dressing

Type of Dressing	Mean Score (of 100)	95% Confidence Interval	SD
Steri-Strips	70.0	69.0–71.0	16.7
Staples	69.7	68.7–70.8	17.7
Gauze	55.9	54.8–56.9	15.6
Surgical tape	43.9	42.9–44.9	17.0
Dermabond	33.5	32.4–34.5	16.7

Table 4. Statistical Testing of the Difference Between Each Pairing of Dressing

Dressing Comparison		Mean Difference	95% CI Difference	P
Surgical tape	Steri-Strips	-26.1	24.1–28.2	0
Surgical tape	Dermabond PRINEO	10.4	8.4–12.5	0
Surgical tape	Staples	-25.8	23.8–27.9	0
Surgical tape	Gauze	-12.0	9.9–14.0	0
Steri-Strips	Dermabond PRINEO	36.54	34.5–38.64	0
Steri-Strips	Staples	0.269	0–4.1	0.99
Steri-Strips	Gauze	14.1	12.1–16.25	0
Dermabond PRINEO	Staples	-36.6	34.2–38.3	0
Dermabond PRINEO	Gauze	-22.4	20.3–24.4	0
Staples	Gauze	13.9	11.8–15.94	0

The 95% confidence intervals shown are of the absolute value of the difference in average cosmetic scores of the pair of dressings. The Tukey-Kramer test was used to determine the *P* value. All pairs except for Steri-Strips compared with staples had a statistically significant difference in average cosmetic score.

An interesting takeaway from compounding the aesthetic, cleanliness, and compactness of dressings into a cosmetic score is that the most aesthetically pleasing dressings do not always end up with the highest score. For example, the bulkiness of gauze causes it to be rated lower even though it was considered to be more aesthetic. Additionally, staples, which may stereotypically be thought to look less “clean” to the surgeon’s eye, actually rates highest of the dressing types in all three categories. With these results, it seems such that patient perception of dressing is based on more than immediate cosmetic appearance. In addition to cosmesis and bulk, patients have their own opinions about how functional, clean-looking, or “strong” a dressing is, which is why staples might have rated so highly in this study. The patient’s own perception of their immediate postoperative dressing is often factored into their overall satisfaction of the procedure, despite minimal functional benefit. As such, it is important to quantify the perception of cleanliness and durability.

Although the ideal situation would allow patients to participate in postoperative wound care–related decision-making to maximize patient satisfaction and facilitate self-management of the wound after discharge, this is not feasible. Each hospital system and each surgeon typically will have their own preferences for surgical dressings, but that should not preclude shared decision-making. Allowing patients to participate in their choice of dressing may lead to increased satisfaction due to more perceived autonomy.

There are several limitations to this study in the realm of later postoperative satisfaction (ie, 2–3 weeks postoperative). In the survey, participants were simply shown pictures of 1-day-old dressings and asked to rate their attractiveness among other characteristics. The ratings do not take into account perceived comfort level of each dressing as it relates to the burden of repeated dressing changes (as with gauze) or pain associated with dressing removal (eg, staples) some weeks later. Patients may not have known from the survey that Dermabond PRINEO is not associated with any dressing changes, which may have skewed the results negatively. Moreover, the outcome of this study may be changed if the final aesthetic outcome of each dressing type were displayed. For example, if the staples happened to leave additional scarring/staple

marks and that scar was shown in a picture to patients, the outcome showing the high rating of staples as an ideal dressing may change.

Limitations also exist inherent to crowdsourcing, including the fact that these represent the opinions of the lay public, which may differ from those of potential patients. In addition, these individuals are financially motivated and may not fully represent the aesthetic ideals of the plastic surgery patient. The photographs depicting each postoperative wound dressing are also not completely representative of the dressings. For example, Steri-Strip and staple placement are not always as neat as depicted in the photographs, which may skew aesthetic scores. Furthermore, the lighting and positioning of the patient are not the same in each of the photographs. Future studies may standardize the lighting and quality of photographs as well as add multiple examples of each with patients of various skin colors to address unconscious biases. Another addition would be to have questions that estimate perceived ease of postoperative wound management based on photographs of dressings to account for people’s opinions about postoperative care as well. Finally, participants were not asked whether they had previous plastic surgery or experience with any of the wound dressing types which is also a limitation of this study and a potential bias.

CONCLUSIONS

Steri-Strips and surgical staples are significantly more cosmetically appealing compared with other postoperative wound dressings when assessed by the general public. Patients may thus be more satisfied with staples, when appropriate, or Steri-Strips in the immediate postoperative period, and this should be taken into consideration as a variable when deciding which dressing to apply to a patient.

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DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

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