

# Compression Garments with Silicone Improve Hypertrophic Scars Compared to Compression Garments Alone: A Retrospective Study

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## INTRODUCTION

The management and reduction of hypertrophic burn scars is one of the major challenges facing healthcare providers in the treatment of burn patients. Areas of scar tissue can cause pruritus, pain and decreased mobility impacting an individual's self-esteem and ability to perform recreational or work functions.<sup>1-2</sup> Two of the mainstay noninvasive clinical practices for hypertrophic scar management, for at least the last 20 years, are the utilization of pressure garments and silicone gel sheeting. Although the mechanism behind the usefulness of these therapies remains incomplete, it is believed silicone in conjunction with compression provides improved occlusion and hydration to the scarred area for better healing.<sup>1</sup> Both therapies have been shown to be effective in reducing hypertrophic scars.<sup>3</sup> However, silicone gel sheeting has some limitations including difficulty maintaining sufficient contact and coverage to certain areas of the body, high cost, possible unfavorable patient reaction to silicone (cellulitis, itching, etc.), and garments with silicone must be washed carefully to ensure maximum efficacy and avoid infection.<sup>4</sup>

Since 2012, we have used garments with silicone gel sheeting for hypertrophic burn scar management in the large pediatric patient population at Riley Children's Hospital. Incorporating the silicone gel sheeting into the custom garments has provided many advantages over traditional custom compression garments namely: they can be initiated immediately even over open wounds, they more effectively limit forces of friction and they remove the difficulty of keeping bandages in place under garments.

In this retrospective study, we compared the effectiveness of compression garments alone and compression garments with silicone gel sheeting in the treatment of burn scar in a pediatric burn population. We hypothesize that garments with silicone would more effectively address both the increased height and the decreased pliability of patients' scars. In addition, garments with silicone would result in an overall decreased modified Vancouver Scar Scale components of pliability, height and vascularity regardless of the location of the scar compared to compression garments alone over a 12-month treatment period.

## METHODS

- Included in this study were patients who were autografted or required >21 days to heal and received at least 12 months of follow up treatment with custom compression garments either with or without silicone between 2013 and 2018.
- None of the patients included in this study received laser treatments during the assessment period.
- Modified Vancouver Scar Scale (VSS) scores were analyzed 1, 3, 6, 9, and 12-months post-injury (or post-surgery) for each patient. The VSS is a widely used and relatively consistent tool to assess burn scars.<sup>5</sup>

| Score | Pliability | Height   | Vascularity |
|-------|------------|----------|-------------|
| 0     | Normal     | Flat     | Normal      |
| 1     | Supple     | < 2 mm   | Pink        |
| 2     | Yielding   | 2-4 mm   | Pink-Red    |
| 3     | Firm       | 4 - 6 mm | Red-Purple  |
| 4     | Banding    | > 6 mm   | Purple      |

Table 1: Modified Vancouver Scar Scale used to quantify patient's scars

- Descriptive statistics were used to summarize the data and *t* tests were used to compare the total VSS scores between the two groups
- In addition, descriptive and ANOVA statistics were performed to compare the effectiveness of silicone compression treatment for scars located on different regions of the body.

|                              | SILICONE | NON-SILICONE |
|------------------------------|----------|--------------|
| Unique Patients              | 70       | 19           |
| Males                        | 40       | 15           |
| Females                      | 30       | 4            |
| Scars with 12 months of data | 99       | 28           |
| Arm Scars                    | 11       | 2            |
| Torso/Back Scars             | 18       | 3            |
| Leg Scars                    | 25       | 16           |
| Foot/Ankle Scars             | 16       | 5            |
| Hand/Wrist Scars             | 29       | 2            |

Table 2: Description of participants and scars included in the study.

## RESULTS

|                    | SILICONE<br>N = 99        |                           |                           |                           |                           |                                | NON-SILICONE<br>N = 28    |                           |                           |                           |                           |                                |
|--------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------------|
|                    | Average<br>1 month        | Average<br>3 months       | Average<br>6 months       | Average<br>9 months       | Average<br>12 months      | % Change<br>after 12<br>months | Average<br>1 month        | Average<br>3 months       | Average<br>6 months       | Average<br>9 months       | Average<br>12 months      | % Change<br>after 12<br>months |
| <b>Pliability</b>  | 1.62<br><i>SD</i> = 0.860 | 1.54<br><i>SD</i> = 0.790 | 1.17<br><i>SD</i> = 0.814 | 0.92<br><i>SD</i> = 0.825 | 0.66<br><i>SD</i> = 0.629 | -59.50%<br><i>p</i> < .001     | 1.23<br><i>SD</i> = 0.668 | 1.23<br><i>SD</i> = 0.735 | 1.13<br><i>SD</i> = 0.922 | 0.82<br><i>SD</i> = 0.682 | 0.73<br><i>SD</i> = 0.631 | -40.58%<br><i>p</i> < .001     |
| <b>Height</b>      | 0.85<br><i>SD</i> = 0.560 | 0.91<br><i>SD</i> = 0.585 | 0.74<br><i>SD</i> = 0.656 | 0.58<br><i>SD</i> = 0.628 | 0.33<br><i>SD</i> = 0.484 | -60.71%<br><i>p</i> < .001     | 0.43<br><i>SD</i> = 0.510 | 0.48<br><i>SD</i> = 0.532 | 0.68<br><i>SD</i> = 0.703 | 0.34<br><i>SD</i> = 0.640 | 0.27<br><i>SD</i> = 0.547 | -37.50%<br><i>p</i> < .001     |
| <b>Vascularity</b> | 1.64<br><i>SD</i> = 0.597 | 1.37<br><i>SD</i> = 0.620 | 1.03<br><i>SD</i> = 0.618 | 0.90<br><i>SD</i> = 0.643 | 0.48<br><i>SD</i> = 0.494 | -70.68%<br><i>p</i> < .001     | 1.57<br><i>SD</i> = 0.590 | 1.39<br><i>SD</i> = 0.587 | 1.13<br><i>SD</i> = 0.703 | 0.93<br><i>SD</i> = 0.626 | 0.80<br><i>SD</i> = 0.610 | -48.86%<br><i>p</i> < .001     |
| <b>Total</b>       | 4.11<br><i>SD</i> = 1.511 | 3.83<br><i>SD</i> = 1.591 | 2.94<br><i>SD</i> = 1.673 | 2.40<br><i>SD</i> = 1.821 | 1.47<br><i>SD</i> = 1.257 | -64.21%<br><i>p</i> < .001     | 3.27<br><i>SD</i> = 1.117 | 3.11<br><i>SD</i> = 1.334 | 2.93<br><i>SD</i> = 1.863 | 2.09<br><i>SD</i> = 1.645 | 1.80<br><i>SD</i> = 1.257 | -44.81%<br><i>p</i> < .001     |

Table 3: VSS score results for patients treated with compression garments with silicone or compression garments alone for 12 months

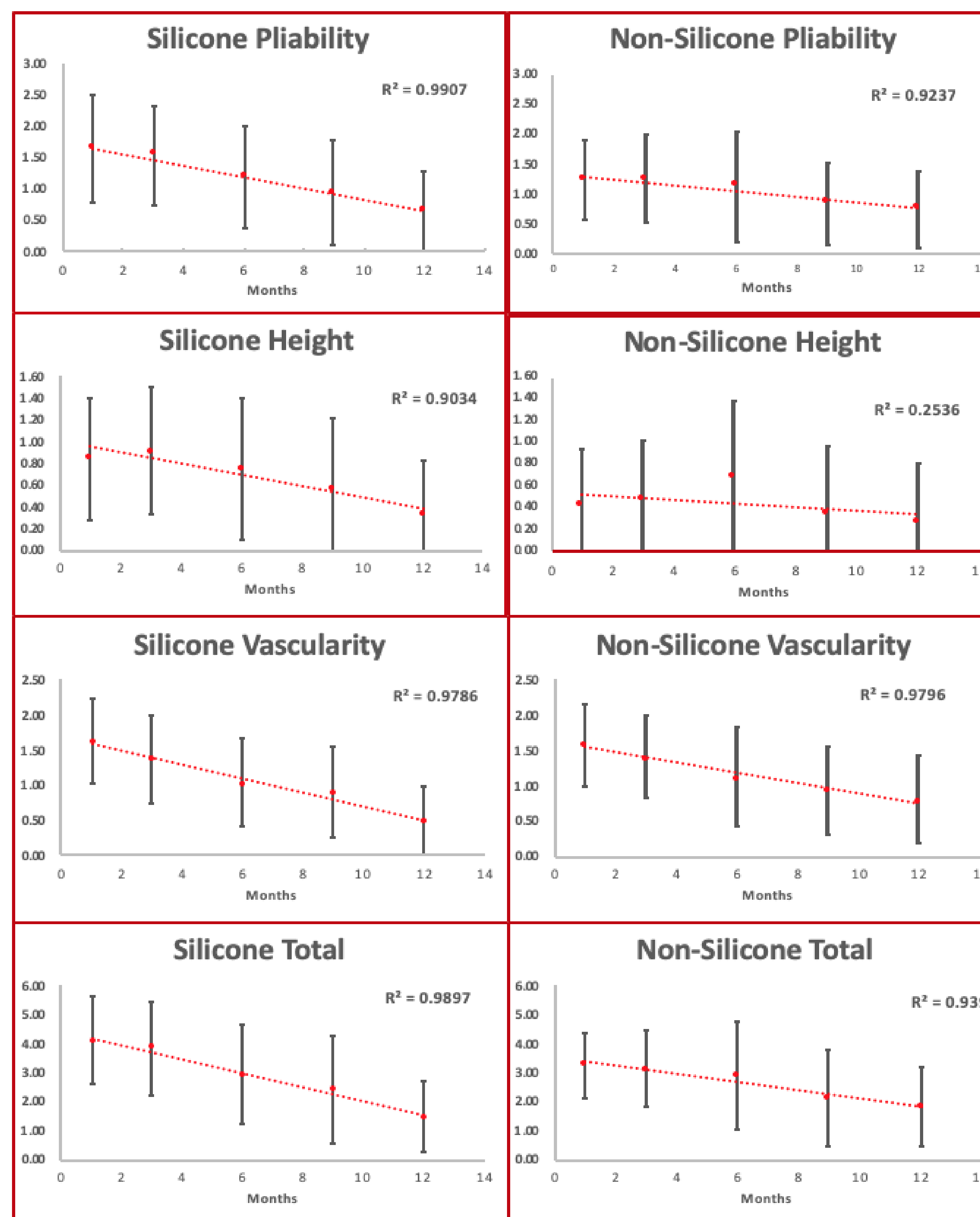


Figure 1: Graphical representation of VSS score results for patients treated with compression garments with silicone or compression garments alone for 12 months

- Both compression garments with silicone and compression garments alone effectively improved the height, pliability, and vascularity of all scars analyzed.
- Treatment with silicone garments resulted in a greater decrease in each aspect of VSS assessed: pliability, vascularity, and height for each time scale measured compared to compression only group (*P* < 0.05).
- There was a statistically significant difference (*P* < 0.05) in the percent decrease over each time scale and across the 12-month period of treatment.
- ANOVA analysis revealed no statistically significant difference between garments with silicone's effectiveness on scars located in different regions of the body based on the composite score of the height, vascularity, and pliability components of the VSS score after 12 months of treatment (*F* (4, 99) = 1.47, *p* < 0.05)

## CONCLUSION

The major accomplishment of this study was providing statistically significant evidence that compression garments with silicone are more effective in improving the pliability, height, and vascularity of hypertrophic burn scars compared to compression garments without silicone. The results support use of silicone for pediatric patients with hypertrophic scars beginning as early as one-month post-surgery/injury. Silicone in garments should be used for the entire duration of a patient's rehabilitation assuming the patient has no adverse reactions to the garments or the silicone. The effectiveness of garments with silicone is independent of the scar location assuming sufficient coverage and contact can be obtained.

This retrospective study supports the clinical practice of using compression garments with silicone for treatment of hypertrophic scars in pediatric burn patients. Although more expensive than compression garments alone, the superior reductions in scarring from the silicone being incorporated into garments will lead to improved long-term patient outcomes and warrant its higher cost.

## LIMITATIONS AND NEXT STEPS

- One major limitation of this study is the size of each sample group. The non-silicone group contained only 19 patients and 28 scars whereas the Silicone group had significantly more patients (70) and scars (99). Further work is needed to expand number of participants included in this analysis.
- Other factors could have impacted the results of this study including depth of burn, patient compliance with wearing garment, and unknown whether scar massage or scar rolling were implemented during the treatment period.
- A randomized control trial is needed to establish a causal relationship between garments with silicone and reduction in VSS scores compared to compression garments alone.
- Furthermore this analysis could be expanded to compare otoplasty use and impact on scar as compared to silicone alone both with garments. Additionally analyzing the cost of silicone gel sheets given to patients versus silicone in garments over a 3-month to 12-month treatment period.
- Finally further studies could analyze the modified VSS scores for patients who received laser treatment and subsequently used silicone compression garments during their rehabilitation.

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