CASE REPORT

Chest wall abscesses due to continuous application of silicone gel sheets for keloid management

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SUMMARY

A patient with three episodes of chest wall abscesses as a result of 6 years of round-the-clock, uninterrupted (except during bathing) application of silicone gel sheets to a chest wall keloid is described. Two of the episodes occurred during hot weather. It is suggested that, in the space beneath the silicone sheet, the higher humidity and temperature, both generated as a result of prolonged sheeting, especially during hot weather, might have caused the keloid and its neighbouring skin to become soggy. This sogginess might have facilitated bacterial invasion. It is suggested that some sheeting-free time during a 24 h period might be indicated so that a keloid and its adjacent skin have the time to recover from their sheeting-induced sogginess. A sheeting-free period might especially be needed in the face of sweat accumulation beneath the silicone sheet.

BACKGROUND

The topical application of silicone gel sheets (sheeting) for the treatment of hypertrophic scars and keloids has been found to be an effective therapy.^{1–12} Not only can pain and pruritus be alleviated but progressive enlargement of the lesion can be curtailed as well. Although complications of sheeting are usually minor, we describe the development of chest wall abscesses in a patient as a consequence of prolonged and essentially uninterrupted sheeting.

CASE PRESENTATION

A 72-year-old man of Chinese descent living in the temperate climate of North Central USA, was observed to harbour a large anterior chest keloid that originated from a 2 cm scar, the consequence of the resection of a small sebaceous cyst 43 years prior. The keloid, 12 cm in length, 2–3 cm in width and 0.3 cm in height, was situated transversely in the left front of the chest at a level 2 cm above the nipple, with its medial end touching the midline of the body. During the first 32 years of its existence, the keloid slowly grew in size but remained relatively asymptomatic apart from the presence of occasional mild itchiness. Eleven years earlier, however, the keloid began to become larger and more symptomatic, with frequent occurrences of annoying pain and intense pruritus. During the ensuing 6 years, the main stay of treatment consisted of the local application of semioclusive silicone gel sheets (Cica-Care Adhesive Gel Sheet, Smith & Nephew Medical Limited, Hull, UK).^{6 7} A silicone sheet measuring 15×12 cm was used to completely cover the keloid and its adjacent skin.

The sheet application was continuous (ie, throughout the 24 h of each day without any interruption except when regular daily showers were taken) for 6 years. Since the sheets were self-adhering, no adhesive tapes were employed. When the continuously used sheets had lost their adhesive property, they were replaced with fresh ones. Sheets were washed with warm water thoroughly each day. In our patient, the continuous application of the sheets not only provided a great deal of symptomatic relief but also helped to ensure that the progressive and rapid enlargement of the lesion was curbed. This was the reason that the sheeting was carried out without interruption by the patient in the absence of medical supervision for a total of 6 years.

During the 6 years of continuous application, the patient experienced three episodes of subcutaneous abscess formation as evidenced, during each episode, by the presence of tenderness, pain, redness and swelling of the keloid, and its neighbouring skin, followed by the rupture of the underlying abscess and the exudation of 1–2 mL of pus. Two of the episodes took place during hot summer days when there was excessive sweating beneath the silicone sheet. All of the three episodes were treated successfully with antibiotic therapy. Unfortunately, culture of the pus was never carried out.

Five years prior to the time of writing, the patient switched to a new regimen of application. The silicone sheets were in place only during waking hours and taken off during sleep. With this new approach, pain and pruritus continue to be in abeyance, the keloid has not enlarged and there has been no recurrence of abscess formation since the switch, to date.

DISCUSSION

Silicone gel sheeting has been found in general to provide satisfactory results in the management of keloids.^{1–12} For example, sheeting has often been able to soften, flatten and blanch scars, and render them more pliable as well as more aesthetic. The process has been reported to reduce scar-related pain and itchiness as well as to retard the growth of scars. Recently, an international multidisciplinary panel of experts on scar management suggested that silicone-based products be employed as the gold-standard, first-line, non-invasive option for the prevention and treatment of scars.¹² Although the exact pathophysiological mechanisms of the action of silicone sheets are still poorly understood, it has been suggested that, on account of their impermeability, these devices function by locking

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moisture into the scar area.^{6 7} The latter then becomes well hydrated as a result.^{6 7} Moreover, not only hydration of the stratum corneum but also the influence of occlusion have now been universally accepted as the major mechanisms responsible for the action of silicones.¹²

With respect to the duration of silicone sheeting, the instruction on the use of the Cica-Care adhesive gel sheet provided by its manufacturer in 2001 recommended that “Cica-Care should be applied at least 12 h per day during the therapy time. If possible Cica-Care should be applied for 24 h, allowing for washing periods...The total therapy time should be in the range of 2–4 months.”⁶

In a current website communication (accessed on 7 October 2014), the manufacturer of Cica-Care suggested that “At first, Cica-Care should be applied to the scar for 2 h a day, building up by 2 h a day to allow your skin to get used to the gel strip ... Treatment times vary from person to person and depend on the nature of the scarring. However, on average, and if used correctly, you can expect best results after 2–4 months.”⁷ In this communication, the application time in a 24 h period was not mentioned.

It is of note that the ideal duration of therapy in terms of the number of hours in a 24 h period and in terms of the total number of treatment months is unknown at present,⁸ as evidenced by the fact that different authors have suggested disparate schedules. Some samples of the diverse recommendations are presented below. In a 1995 study, an application time of 12–24 h for a period of 2–6 months was used.² Brissett and Sherris⁸ recommended a minimum daily application time of 12 h and tapering of application over a 1 month period. From 2003 to 2011, three separate investigations have recommended the use of sheeting for 22–24 h a day over a period of 6 months.^{9–11} Finally, certain scar management guidelines have suggested that silicone sheets be worn over scars for 12–24 h each day for 3–6 months.^{12 13} From our patient's experience, however, it would seem prudent to have some application-free time during each 24 h period. In this regard, a sheeting-free period of 12 h out of every 24 has also been previously recommended.^{2 5}

We believe that a “sheeting-free period” approach is preferred because, at times, a large amount of moisture can accumulate beneath a silicone sheet (especially with excessive sweating during hot weather or during strenuous physical activity). The combination of too much moisture and too high a temperature in the tight subsilicone sheet space for too long can not only render a keloid and its adjacent skin soggy, but can also provide an ideal environment for bacteria to proliferate. It would then be an easy task for the abundant proliferating bacteria to gain entry into the body via small breaks in the soggy tissues.

A rest period without silicone application can help the hydrated keloid and its neighbouring skin to recover by disposing of some of the excess moisture through evaporation, thus improving their ability to resist bacterial invasion. Finally, the role played by hot weather in two of the episodes of abscess formation in our patient is reminiscent of the silicone sheeting-related untoward effects of skin breakdown (8%) and skin maceration (16%) encountered by a group of hypertrophic scar-afflicted patients residing in the hot environs of Saudi Arabia.¹⁴ Although no abscess formation was described in that report, much sweating beneath a silicone gel sheet in the face of long stretches of hot weather would appear to be, partially at least, instrumental in making the underlying skin more susceptible to the structural damages reported.¹⁴

It has been recommended that in warm weather or during physical activity where sweating may occur, silicone sheets should be cleaned more often for comfort and for maintaining optimal contact with the skin.^{6 7} This precaution should be closely observed. However, we believe that if a sheeting-free period is not allowed, bacterial invasion will still be more likely to take place in the face of high moisture and high temperature even if the silicone sheets have been cleaned more frequently.

The total treatment time for silicone gel sheeting per therapy course has initially been suggested to be in the range 2–4 months.⁶ However, in some reports, the duration of a sheeting treatment course has been as long as 6 months.^{2 9–11 13} It has been determined that, in the treatment of keloids with silicone sheeting, it would take: (1) 1 month of therapy for pain and pruritus to improve, (2) 3 months for these symptoms to dissipate, and for redness and scar height to lessen and (3) 6 months for the number of mast cells in the scar and the enhanced expression of Fas antigen by fibroblasts to fall.⁴ As of the consistent favourable response that our patient experienced from the sheeting treatment, he decided on his own to defy the instructions provided by the sheet manufacturer and to adhere to his own 6-year, continuous 24 h application method. Obviously a mistake, this unconventional, prolonged, uninterrupted application did invite bacterial infection and abscess formation.

The fact that our patient experienced five subsequent years of abscess-free sheeting after a daily sheeting-free period had been incorporated into the treatment regimen, suggests that this interrupted, long-term sheeting approach might be safely carried out. Further investigations are required to determine if such an approach is prudent.

Learning points

- ▶ Prolonged silicone gel sheeting for the treatment of keloid can be complicated by abscess formation at the site of application.
- ▶ In warm weather or during physical activity where sweating may occur, silicone sheets should be cleaned more often.
- ▶ A ‘sheeting-free period’ approach may reduce the risk of bacterial infection during long-term silicone gel sheeting application for keloid management.

Competing interests None declared.

Patient consent Obtained.

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REFERENCES

- 1 Carney SA, Cason CG, Gowar JP, et al. Cica-Care gel sheeting in the management of hypertrophic scarring. *Burns* 1994;20:163–7.
- 2 Katz BE. Silicone gel sheeting in scar therapy. *Cutis* 1995;56:65–7.
- 3 Williams C. Cica-Care: adhesive gel sheet. *Br J Nurs* 1996;5:875–6.
- 4 Eishi K, Bae SJ, Ogawa F, et al. Silicone gel sheets relieve pain and pruritus with clinical improvement of keloid: possible target of mast cells. *J Dermatolog Treat* 2003;14:248–52.
- 5 Sproat JE, Dalcin A, Weitauer N, et al. Hypertrophic sternal scars: silicone gel sheet versus Kenalog injection treatment. *Plast Reconstr Surg* 1992;90:988–92.
- 6 Insert dated 2001 and provided by Smith & Nephew Medical Limited for Cica-Care Adhesive Gel Sheet.
- 7 Smith&Nephew. Cica-Care: Self-Adhesive Silicone Gel Sheet information. <http://www.smith-nephew.com/key-products/advanced-wound-management/cicacare/> (accessed 7 Oct 2014).

- 8 Brissett AE, Sherrius DA. Scar contractures, hypertrophic scars and keloids. *Facial Plast Surg* 2001;17:263–71.
- 9 So K, Umraw N, Scott J, *et al*. Effect of enhanced patient education on compliance with silicone gel sheeting and burn scar outcome: a randomized prospective study. *J Burn Care Rehabil* 2003;24:411–17.
- 10 Li-Tsang CW, Lau JC, Choi J, *et al*. A prospective randomized clinical trial to investigate the effect of silicone gel sheeting (Cica-Care) on post-traumatic hypertrophic scar among the Chinese population. *Burns* 2006;32: 678–83.
- 11 Sakuraba M, Takahashi N, Akahoshi T, *et al*. Experience of silicone gel sheets for patients with keloid scars after median sternotomy. *Gen Thorac Cardiovasc Surg* 2010;58:407–70.
- 12 Meaume S, LePillouier-Prost A, Richert B, *et al*. Management of scars: updated practical guidelines and use of silicones. *Eur J Dermatol* 2014;24:435–43.
- 13 Middelkoop E, Monstrey S, Teot L, *et al*. *Scar management practical guidelines*. Maca-Cloetens, 2001:1–109.
- 14 Nikkonen MM, Pitkanen JM, Al-Qattan MM. Problems associated with the use of silicone gel sheeting for hypertrophic scars in the hot climate of Saudi Arabia. *Burns* 2001;27:498–501.

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