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REVIEW ARTICLE

Post-Sternotomy Scarring: Current Challenges and Treatment Strategies for Keloids and Hypertrophic Scars

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Abstract

Background: Sternotomy is a common surgical approach in cardiac surgery, but it is associated with the development of both hypertrophic scars (HTS) and keloids. These scars are often problematic, leading to aesthetic concerns, functional impairments, and in some cases, pain or discomfort. This study reviews the various management strategies for keloid and hypertrophic scars post-sternotomy.

Objective: To evaluate current treatment options for preventing and managing keloid and hypertrophic scars following sternotomy and assess their effectiveness in improving patient outcomes.

Methods: A review of the literature on scar formation post-sternotomy and management interventions.

Results: Several management options are available, including steroid injections, silicone gel sheets, laser therapy, surgical revision, and radiotherapy, with varying success rates.

Conclusion: A combination of early intervention, preventative measures, and individualized treatment plans can significantly reduce the formation of keloid and hypertrophic scars post-sternotomy.

Keywords

Sternotomy, Keloid, Hypertrophic

Introduction

Sternotomy is widely used in cardiac surgery for access to the heart, aorta, and other thoracic structures. However, one of the common post-operative complications is the development of hypertrophic scars (HTS) and keloids at the incision site. While hypertrophic scars tend to remain confined to the wound site and may regress over time, keloids extend beyond the original injury and may become progressively larger, often causing aesthetic and functional concerns.

These scars can result in cosmetic dissatisfaction, pain, pruritus, and in some cases, restrictive chest movement. The management of these scars, especially in patients undergoing sternotomy, is crucial for improving post-surgical recovery, comfort, and long-term outcomes. This review explores the latest management strategies for these conditions, with a focus on preventing and treating keloid and hypertrophic scars in the sternotomy patient population (Figure 1) [1].

Scar Formation Post-Sternotomy

Hypertrophic Scars (HTS)

These are characterized by thickened, raised scars that develop within the boundaries of the original wound. They typically occur in individuals with a history of increased collagen production during wound healing and tend to improve over time.

Keloids

Keloids extend beyond the boundaries of the original incision, growing progressively with an excessive accumulation of collagen.

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Figure 1: Chest keloid after open heart surgery [1].

Unlike hypertrophic scars, keloids do not regress spontaneously and may require more aggressive intervention.

Several factors increase the risk of developing these types of scars post-sternotomy, including genetics, age, skin type, infection, and the surgical technique used.

Management Strategies for Keloid and Hypertrophic Scars

Steroid therapy

One of the most common methods for preventing and treating hypertrophic scars involves the use of intralesional corticosteroids (e.g., triamcinolone acetonide). This treatment helps to reduce collagen synthesis and inflammation in the scar tissue [2].

Surgical intervention

Scar Excision and Wound Closure for large keloid formations, surgical excision may be performed. However, recurrence is common, and excision should be combined with other treatments such as radiotherapy or steroid therapy to prevent recurrence [3].

Silicone Gel Sheets and Silicone Gel

Silicone-based products are commonly used to treat hypertrophic and keloid scars. These have been shown to reduce scar volume, redness, and pain. Silicone gels and sheets can be applied topically and are used for several months after surgery to prevent excessive scar formation [4].

Laser Therapy including pulsed dye laser (PDL), fractional CO_2 laser, and non-ablative lasers, has been proven to be effective in both the prevention and treatment of hypertrophic scars and keloids. These lasers can help to flatten the scars, reduce pigmentation, and promote collagen remodeling [5].

Radiotherapy

Radiotherapy has been used in conjunction with excision or steroid injections to reduce the recurrence of keloids and hypertrophic scars. Although it carries risks of long-term side effects, it can be beneficial in cases of aggressive or recurrent scars [6].

Pressure garments

Post-surgical pressure garments can help reduce scar formation by applying consistent pressure to the wound site, thereby limiting the extent of hypertrophic scar formation. These garments are commonly used after burn injuries but are also beneficial post-sternotomy [7].

Discussion

Post-sternotomy hypertrophic scars and keloids are challenging to manage due to their potential to cause both cosmetic and functional complications. While intralesional steroids and silicone-based products remain first-line treatments, more aggressive interventions like laser therapy and radiotherapy have shown promising results in difficult cases. Additionally, a combination approach, including early intervention and preventative measures, is crucial in reducing scar formation and improving patient outcomes.

The choice of treatment should be individualized based on factors such as scar size, patient preference, and risk factors for recurrence. Moreover, patient education on scar management post-surgery can improve compliance with preventive therapies, thereby enhancing the effectiveness of treatment.

Conclusion

Keloid and hypertrophic scars following sternotomy are significant concerns for patients, both in terms of aesthetic outcomes and functional limitations. Timely intervention, including steroid injections, silicone gel sheets, laser therapy, and surgical revision, is essential for managing these scars effectively. Continued research into novel treatment options and a multimodal approach to scar management is crucial to improving post-sternotomy recovery and quality of life.

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