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Role of Massage on the Management of Hypertrophic Scar: Review

Emad T. Ahmed*

Associate professor of Physical therapy, College of Applied Medical Sciences, Taif University, Taif, KSA

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Abstract

Nonsurgical techniques to help prevent and treat abnormal scars include laser therapy, intralesional agents, cryotherapy, radiation, pressure therapy, occlusive dressings, topical agents, and scar massage. Some surgeons recommend scar massage during wound healing to improve aesthetic outcome. There is a lack of consistency regarding when to initiate treatment, technique, frequency, and duration of therapy. The aim of this review article was to summarize the published literature regarding the use of scar massage and to propose ways to integrate this therapy into the practice of physical therapy in the management of scar.

Keywords: *Massage, Hypertrophic scar, Physical therapy*

Introduction

Hypertrophic scarring after surgical procedures and trauma, especially, burns, is a great concern for patients and a challenging problem for clinicians. Peacock defined hypertrophic scars as scars raised above the skin level but within the confines of the original lesion[1] . Hypertrophic scars may cause significant functional and cosmetic impairment, pain, and pruritus, which compromise the patients' quality of life[2]. These scars are caused by a general failure in normal wound-healing processes[3]. Post-burn hypertrophic scars typically appear on the trunk and extremities.

Hypertrophic scars usually develop within 1–3 months of injury, whereas keloid scars may appear up to 12 months after the injury[4]. The nature of scarring appears to depend on factors such as race, age, genetic predisposition, hormone levels, atopy, and immunologic responses of the patient, type of injury, wound size and depth, anatomic region affected, and mechanical tension on the wound[5]. The presence of complications, such as bacterial colonization and infection of the wound, seems to promote hypertrophic scarring[5,6]. The development of hypertrophic scars in burn wounds is mainly influenced by the time to heal and the depth and size of the wound[7,8]. Unfortunately, most of the reports published on post-burn scarring do not accurately define these factors[9,10], and only a few authors have used validated criteria or classification systems to define hypertrophic scarring [11].

Hypertrophic scars are currently managed by application of silicone gel, pressure therapy, intralesional corticosteroid injection, laser therapy, cryotherapy, radiation, surgery, etc. According to Roh *et al*., massage therapy for post-burn hypertrophic scar improved pruritus, Vancouver scar scale (VSS), and depression[12].

The aim of this review article was to summarize the published literature regarding the use of scar massage and to propose ways to integrate this therapy into the practice of physical therapy in the management of hypertrophic.

Rationale for using hypertrophic scar

Evidence to support the use of scar massage is inconclusive, although efficacy appears to be greater in postsurgical scars. There was much variability and inconsistency with regard to when treatment should be initiated, treatment protocol and duration, outcomes evaluated, and how the outcomes were measured. Because these results are difficult to interpret, evidence-based recommendations cannot be made. Potential positive effects of scar massage include involving patients in their treatment, hastening the release and absorption of buried sutures, aiding the resolution of swelling and induration, and economic value—especially compared with silicone gels. Possible negative aspects of this therapy include wasting the patient's time if massage is not an efficacious treatment, irritation from friction, and developing irritant or contact dermatitis from the lubricant used for massage.[13]

They are many types of massage, such as effleurage, friction, and petrissage. Basically, the effects of massage are reflex and mechanical. The reflex effects of massage therapy are realized through the stimulation of the afferent peripheral nerves to the central nervous system to produce muscle relaxation, a decrease in painful

Corresponding author's ORCID ID: 0000-0000-0000-0000
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sensations, and an overall sense of well-being. The mechanical effects of massage are related to an improvement in venous return and lymphatic drainage. Further, massage therapy stimulates movement between muscle fibers, which results in more fluid muscle movement.[14]

Effect of massage on management of hypertrophic scar:

In addition to physical modifications of the scar, massage may have other benefits. Massage therapy is an effective adjunct therapy in managing lower back pain, depression, addiction, atopic dermatitis, etc.[15,16]. Connective tissue massage produces a statistically significant elevation of beta-endorphins levels in healthy volunteers[17], which suggests that this therapy may have a beneficial effect on the pain relief and the patients' sense of well-being. Other studies have shown reduction of urinary cortisol level and increase in serotonin and dopamine levels after massage therapy[18,19], which suggests that massage therapy may improve the patients' mood and decrease anxiety. In addition to the release of endogenous opioid peptides and neurotransmitters, the beneficial effect of massage therapy on pain be explained by the gate theory of pain, described by Melzack and Wall in 1965 [20].

A study of cultured human skin fibroblasts by Kanazawa and colleagues revealed a decrease in messenger ribonucleic acid (mRNA) and protein levels of connective tissue growth factor and collagen type 1 alpha 2 (Col1a2) after 24 h of uniaxial cyclical stretching[21] .

Because connective tissue growth factor has been implicated in maintaining fibrosis induced by transforming growth factor-beta[22], its downregulation may prevent abnormal scarring. In another in vitro model, human hypertrophic scar samples responded to mechanical loading by inducing apoptosis and decreasing levels of tumor necrosis factor-alpha [23], although another study showed that biaxial mechanical strain upregulates matrix metalloproteinase-1 and collagen type 1 and 3 mRNA expression and downregulates the proapoptotic protein Bax[24]. These results suggest that massage may be exert its beneficial effects through its ability to affect matrix remodeling and fibroblast apoptosis, although the exact mechanism remains to be determined.

On the other hand, other study[25] failed to demonstrate any appreciable effects of massage therapy on the vascularity, pliability, and height of the HTS studied, although there were reports of a decrease in pruritus in some patients. This study examines the use of friction massage over a 3-month period in a group of 30 pediatric patients with HTS. The patients were randomly assigned to receive either therapeutic massage sessions of 10 minutes per day in combination with treatment with pressure garments or they were treated with pressure garments alone.

Application of massage

Based on the publications analyzed, it is reasonable to recommend beginning scar massage after nonabsorbable sutures are removed from wounds closed using primary intention. This is generally 10 to 14 days after primary closure but will vary depending on the anatomic site and the presence of skin flaps or grafts. Early massage should be avoided in light of evidence that mechanical pressure during early phases of wound healing promoted hypertrophic scar formation in a mouse model[26]. Friction massage for 10 minutes twice a day can be titrated up or down as tolerated. The duration of massage therapy reported in the literature ranges from one treatment to 6 months, and further investigation is needed to determine the optimal treatment interval.[13]

Contraindication of massage:

Contraindications include compromised integrity of the epidermis, acute infection, and bleeding. Clean hands are obligatory before massage therapy. The emollient used should be nonirritating and free of any known sensitizers. Enough pressure should be applied to blanch the scar, but one should avoid excessively sliding the fingers across the skin to prevent injury to the epidermis. Realistically, patients will probably discontinue the therapy when they deem it is ineffective or when the scar is optimally improved. Scar massage should be promptly terminated if the patient develops a break in the epidermis, infection, bleeding, wound dehiscence, graft failure, intolerable discomfort, or hypersensitivity to the emollient.[13]

Conclusion

In spite of the lack of evidence, massage should theoretically be effective. One hypothesis to support its use is that mechanical disruption of fibrotic tissue increases the pliability of the scar. Mechanical forces induce changes in the expression of extracellular matrix proteins and proteases, and massage may alter the structural and signaling milieu.[27,28]

So that, massage therapy may be incorporated into the physical therapy regime for the management of hypertrophic scar.

References

[1]. Peacock, E. E., Madden, J. W. & Trier, W. C. Biologic basis for the treatment of keloids and hypertrophic scars. *Southern medical journal* 63, 755–60 (1970).
[2]. Bock, O., Schmid-Ott, G., Malewski, P. & Mrowietz, U. Quality of life of patients with keloid and hypertrophic scarring. *Archives of Dermatological Research* 297, 433–438 (2006).
[3]. Van der Veer, W. M. *et al.* Potential cellular and molecular causes of hypertrophic scar formation. *Burns* 35, 15–29 (2009).
[4]. Brissett, A. E. & Sherris, D. A. Scar contractures, hypertrophic scars, and keloids. *Facial plastic surgery : FPS* 17, 263–72 (2001).
[5]. Niessen, F. B., Spauwen, P. H., Schalkwijk, J. & Kon, M. On the nature of hypertrophic scars and keloids: a review. *Plastic and reconstructive surgery* 104, 1435–58 (1999).

[6]. Niessen, F. B., Schalkwijk, J., Vos, H. & Timens, W. Hypertrophic scar formation is associated with an increased number of epidermal Langerhans cells. *The Journal of pathology* 202, 121–9 (2004).
[7]. Deitch, E. A., Wheelahan, T. M., Rose, M. P., Clothier, J. & Cotter, J. Hypertrophic burn scars: analysis of variables. *The Journal of trauma* 23, 895–8 (1983).
[8]. Cubison, T. C. S., Pape, S. A. & Parkhouse, N. Evidence for the link between healing time and the development of hypertrophic scars (HTS) in paediatric burns due to scald injury. *Burns : journal of the International Society for Burn Injuries* 32, 992–9 (2006).
[9]. Spurr, E. D. & Shakespeare, P. G. Incidence of hypertrophic scarring in burn-injured children. *Burns* 16, 179–181 (1990).
[10]. Bombaro, K. M. *et al.* What is the prevalence of hypertrophic scarring following burns? *Burns : journal of the International Society for Burn Injuries* 29, 299–302 (2003).
[11]. Mustoe, T. A. *et al.* International clinical recommendations on scar management. *Plastic and reconstructive surgery* 110, 560–71 (2002).
[12]. Roh, Y. S., Cho, H., Oh, J. O. & Yoon, C. J. Effects of skin rehabilitation massage therapy on pruritus, skin status, and depression in burn survivors. *Taehan Kanho Hakhoe chi* 37, 221–6 (2007).
[13]. Shin, T. M. & Bordeaux, J. S. The Role of Massage in Scar Management: A Literature Review. *Dermatologic Surgery* 38, 414–423 (2012).
[14]. Cho, Y. S. *et al.* The effect of burn rehabilitation massage therapy on hypertrophic scar after burn: A randomized controlled trial. *Burns* 40, 1513–1520 (2014).
[15]. Field, T. Massage therapy. *The Medical clinics of North America* 86, 163–71 (2002).
[16]. Hernandez-Reif, M., Field, T., Krasnegor, J. & Theakston, H. Lower back pain is reduced and range of motion increased after massage therapy. *The International journal of neuroscience* 106, 131–45 (2001).
[17]. Kaada, B. & Torsteinbø, O. Increase of plasma beta-endorphins in connective tissue massage. *General pharmacology* 20, 487–9 (1989).
[18]. Field, T., Diego, M. A., Hernandez-Reif, M., Schanberg, S. & Kuhn, C. Massage therapy effects on depressed pregnant women. *Journal of psychosomatic obstetrics and gynaecology* 25, 115–22 (2004).
[19]. Field, T., Grizzle, N., Scafidi, F. & Schanberg, S. Massage and relaxation therapies' effects on depressed adolescent mothers. *Adolescence* 31, 903–11 (1996).
[20]. Melzack, R. & Wall, P. D. Pain mechanisms: a new theory. *Science (New York, N.Y.)* 150, 971–9 (1965).
[21]. Kanazawa, Y. *et al.* Cyclical cell stretching of skin-derived fibroblasts downregulates connective tissue growth factor (CTGF) production. *Connective tissue research* 50, 323–9 (2009).
[22]. Chujo, S. *et al.* Connective tissue growth factor causes persistent proalpha2(I) collagen gene expression induced by transforming growth factor-beta in a mouse fibrosis model. *Journal of cellular physiology* 203, 447–56 (2005)
[23]. Renò, F. *et al.* In vitro mechanical compression induces apoptosis and regulates cytokines release in hypertrophic scars. *Wound repair and regeneration : official publication of the Wound Healing Society [and] the European Tissue Repair Society* 11, 331–6 (2003).
[24]. Derderian, C. A. *et al.* Mechanical strain alters gene expression in an in vitro model of hypertrophic scarring. *Annals of plastic surgery* 55, 69–75; discussion 75 (2005).
[25]. Patiño, O., Novick, C., Merlo, A. & Benaim, F. Massage in hypertrophic scars. *The Journal of burn care & rehabilitation* 20, 268–71; discussion 267 (1999).
[26]. Aarabi, S. *et al.* Mechanical load initiates hypertrophic scar formation through decreased cellular apoptosis. *FASEB journal : official publication of the Federation of American Societies for Experimental Biology* 21, 3250–61 (2007).
[27]. Chan, M. W. C., Hinz, B. & McCulloch, C. A. Mechanical induction of gene expression in connective tissue cells. *Methods in cell biology* 98, 178–205 (2010).
[28]. Bhadal, N. *et al.* The effect of mechanical strain on protease production by keratinocytes. *The British journal of dermatology* 158, 396–8 (2008).