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MANUAL THERAPY IN POST-OPERATIVE SCAR MANAGEMENT: A NARRATIVE REVIEW

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Abstract: Post-operative scars often lead to complications such as pain, restricted mobility, and poor tissue compliance, which can negatively impact a patient's physical function and quality of life. Manual therapy interventions, including scar massage, mobilization, dry needling, kinesiology taping, and cupping therapy, have been increasingly used to address these issues. This narrative review explores the current evidence supporting the use of manual therapy techniques in post-operative scar management. The current review aims to highlights effectiveness of these methods in enhancing tissue mobility, reducing adhesions, improving scar quality, and contributing to better patient outcomes.

Index Terms **- Post-operative scars, Manual therapy, Scar mobilization, Dry needling, Kinesiology taping, Cupping therapy**

INTRODUCTION

Surgical scars are inevitable after operative procedures and may lead to functional impairments such as restricted joint range, altered sensory feedback, and cosmetic concerns[1]. If not managed appropriately, these scars can become hypertrophic or adherent to underlying tissues, limiting normal biomechanics and contributing to pain[2].Manual therapy has emerged as a promising non-invasive approach in the rehabilitation of post-operative scars. It aims to address underlying tissue adhesions, promote remodeling, and restore functional movement[3]. This review discusses various manual therapy techniques, including scar massage, mobilization, dry needling, kinesiology taping, and cupping therapy, and their role in scar rehabilitation.

PATHOPHYSIOLOGY AND IMPLICATIONS OF POST-OPERATIVE SCARS

Post-operative scars undergo a series of biological phases including inflammation, proliferation, and remodeling. Abnormal scarring may result from imbalanced collagen synthesis and inadequate remodeling, leading to fibrotic, raised, or immobile scars[4].

Patients may experience:

1. Limited skin and fascial mobility
2. Localized pain or discomfort
3. Aesthetic dissatisfaction
4. Altered proprioception and functional disability[5]

Manual therapy techniques help address these issues through mechanical stimulation, neuromuscular re-education, and enhanced vascularity.

MANUAL THERAPY TECHNIQUES IN SCAR REHABILITATION

SCAR MASSAGE AND MOBILIZATION

Scar massage involves applying multidirectional manual pressure to desensitize the area, improve circulation, and prevent adhesion formation[1]. Mobilization, on the other hand, focuses on detaching adhered tissue planes such as skin from fascia or muscle through targeted manipulation techniques[6].These interventions improve elasticity, reduce fibrosis, and restore skin glide

necessary for normal movement. Regular practice in the early stages of scar formation has been shown to prevent hypertrophy and improve functional outcomes[2].

Common Techniques:

1. Skin rolling
2. Cross-friction massage
3. Myofascial release

fig-1: Scar massage and mobilization

DRY NEEDLING

Dry needling involves inserting fine needles into the scar and surrounding tissues to induce localized inflammation, stimulate fibroblast activity, and improve collagen reorganization[7]. This intervention is especially effective for painful or hypertrophic scars with limited pliability.A randomized controlled trial showed significant improvement in scar compliance and reduced discomfort post-needling[8]. It is hypothesized that mechanical disruption also stimulates nerve endings, enhancing proprioceptive input and reducing neuropathic symptoms[9].

Application Methods:

1. Piston technique
2. Static needling
3. Dynamic needling
4. Electrical dry needling

Common Techniques:

1. Surrounding the Dragon
2. Linear needling
3. Threading technique
4. Grid or Matrix needling

fig-2: Dry needling for scar

KINESIOLOGY TAPING

Kinesiology taping is a therapeutic modality that applies elastic tape over or around the scar to lift the skin, reduce tension, and facilitate lymphatic drainage[10]. It can also enhance proprioceptive feedback and normalize sensory input in the affected region.

Studies in post-mastectomy and orthopedic populations reveal that taping helps reduce scar thickness, improve cosmetic outcomes, and support better joint mobility[11].

Application Methods:

1. Crisscross tape application over scar
2. Lymphatic correction techniques
3. Mechanical lifting with stretch

fig-3: Cupping therapy for scar

CUPPING THERAPY

Cupping therapy utilizes negative pressure to lift scarred tissue, improve vascularity, and break fascial adhesions[12]. It is useful for treating mature, adherent scars where manual lifting is difficult. .Research has found that cupping increases oxygen delivery and local perfusion, thus facilitating tissue regeneration[13]. Combining cupping with mobilization or massage may offer synergistic benefits for deeply anchored scars.

Techniques Used:

1. Static cupping over scar
2. Gliding cupping along fascial planes

fig-4: Cupping therapy for scar

OTHER MANUAL THERAPY TECHNIQUES

Other modalities such as myofascial release, instrument assisted soft tissue mobilization (IASTM), and manual lymphatic drainage also support scar rehabilitation[14]. These approaches target tissue extensibility, fluid clearance, and sensory normalization. When applied as part of a comprehensive rehabilitation protocol, these techniques may significantly improve long-term outcomes and patient satisfaction[15].

BENEFITS OF MANUAL THERAPY IN SCAR MANAGEMENT

The therapeutic goals of manual therapy in scar rehabilitation include:

1. Improving tissue pliability and skin mobility
2. Reducing scar-related pain and hypersensitivity
3. Enhancing joint function and movement
4. Improving aesthetic and psychological outcomes[16]

Patients report improvements in daily activities, emotional well-being, and body image when scars become more pliable and less prominent.

CHALLENGES AND FUTURE DIRECTIONS

While manual therapy shows promise, standardized treatment protocols are lacking.

Challenges include:

1. Variability in therapist skill and technique
2. Patient compliance and fear of pain
3. Limited high-quality RCTs specific to each modality

Future research should focus on comparative trials, optimal dosage, and multimodal protocols for scar rehabilitation[8].

CONCLUSION

Manual therapy offers a versatile and patient centered approach to managing post-operative scars. Techniques such as massage, mobilization, dry needling, kinesiology taping, and cupping address both structural and sensory components of scarring. When implemented early and consistently, these interventions improve functional recovery and quality of life. Continued research and standardized guidelines will enhance clinical outcomes and integration into routine practice.

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