Journal of Bodywork & Movement Therapies (2014) 18, 112–118

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Connective tissue manipulation: A review of theory and clinical evidence

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Received 30 April 2013; received in revised form 20 August 2013; accepted 25 August 2013

KEYWORDS
Connective tissue massage;
Connective tissue manipulation;
Autonomic function

Summary Connective tissue manipulation or connective tissue massage (bindegewebsmassage) is a manual reflex therapy in that it is applied with the therapist's hands which are in contact with the patient's skin. The assessment of the patient and the clinical decision-making that directs treatment is based on a theoretical model that assumes a reflex effect on the autonomic nervous system which is induced by manipulating the fascial layers within and beneath the skin to stimulate cutaneo-visceral reflexes. This paper reviews the literature and current research findings to establish the theoretical framework for CTM and the evidence for its clinical effects. The rationale for the principles of treatment are discussed and the evidence for the clinical effectiveness assessed through an analytical review of the clinical research.

Introduction

Connective Tissue Manipulation (CTM) is a manual reflex therapy which was originally known as Bindegewebsmassage. It was developed in Germany from the 1930s onwards, spread throughout Europe and was introduced to the UK in the 1950s as Connective Tissue Massage (Holey, 1995a, 2000). It was subsequently, from the 1980s, referred to as Connective Tissue Manipulation (Ebner, 1980), as the term massage was thought to be misleading in this context. The terms are used synonymously in the literature and in this review.

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This paper reviews the literature and current research findings to establish the theoretical framework for CTM and the evidence for its clinical effects. The specificity of CTM as a treatment approach warrants some explanation, so for this purpose, reference to textbook literature has been

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http://dx.doi.org/10.1016/j.jbmt.2013.08.003

included. The rationale for the principles of treatment will be discussed and. the evidence for its clinical effectiveness will be assessed through analysis of the clinical research.

CTM

CTM is used within the bodyworker's scope of practice, and, based on clinical experience, can be effective in treating four types of clinical problem. These are either zonal, where the autonomically-induced changes in the tissues of the reflex zone themselves are thought to be producing symptoms; hormonal/endocrine (such as menopausal or menstrual problems, diabetes if within the therapist's scope of practice); local mechanical/musculoskeletal (chronic nerve root pain, for example); or other symptoms, not fitting into these categories, resulting from a general autonomic imbalance (such as sleeplessness, restlessness and anxiety after screening for mental health problems). Several of these categories often co-exist and the problem often presents as a painful condition. Where pain is understood to have an autonomic component, this indicates the patient's suitability for CTM as an intervention. At the initial assessment, the signs and symptoms build into a picture of skin and fascial changes with diverse but autonomically linked symptoms. The connective tissue changes may appear in a region some distance away from the symptoms, in reflex zones which can be seen and palpated and also anatomically explained. CTM is therefore distinguished from other therapeutic approaches which involve manipulation of connective tissue, by being based on the reflex zones of Head (Ebner, 1980). It is also characterised by the specific principles which are followed by the practitioner and the type of manual stroke used.

Head's Connective Tissue Zones are areas of the skin and superficial connective tissue which appear to be indrawn and feel tight or adherent in chronic situations or 'puffy' and swollen in acute conditions. They share the same spinal segment as their related organ or physiological function although the downwards pull of gravity on skin makes them appear a little lower (Holey, 1995b). The heart zone covers the posterior skin area over the left side of the thorax, levels T1-5 and corresponds with the sympathetic innervation of the heart. (Holey, 1995a). Head identified these by linking the tissue changes to symptoms, and Tierich-Leube, in particular, added further clarification based on her experience of observing therapeutic effects of their manipulation. It has been postulated that a specific effect can be obtained on a structure by targeting treatment within the relevant zone via the cutaneo-visceral reflex, but also that a positive effect is obtained through stimulation of the suprasegmental cutaneo-visceral reflex. This could explain why patients often improve considerably by treatment of the 'Basic section' wherever the problem lies.

The stroke is highly specific in two ways. Firstly, the hand positions are important to ensure that sufficient and appropriately-directed traction is exerted at the tissue interfaces. The most effective ways are through the pad of the longest (usually middle) finger or the ends of the thumbs.

Secondly, as the aim is to reach the fascial interface, patterns of strokes are used to enable access to the deep fascia where it lies directly under the skin (Fig. 1). This avoids uncomfortable side effects of treatment. Once the active (visible, palpable and symptomatic) or silent (visible, palpable but asymptomatic) Head's zones are identified, they are linked to the symptoms to build a hypothesis of causation. A treatment plan is developed and the contra-indications of acute inflammation, active infection, malignancy, unstable blood pressure/heart conditions, haemorrhage, early or late stage pregnancy, menstruation and use of anxiolytic drugs are excluded.

The principles of treatment are:

1. **The skin must be displaced in relation to the underlying layer.** This creates a shear force at the tissue interface. This mechanical deformation stimulates mechanoreceptors. It also activates mast cell secretion, potentially of histamine, nitric oxide, vasoactive intestinal polypeptide (a vasodilator) and heparin. These cells are present in large numbers around blood vessels (Theoharides et al., 2010). An accurate, skilled, CTM fascial stroke will often produce a triple response reaction of reddening and swelling in a line (wheal) but excessive or inaccurate strokes may produce skin irritation and discomfort.
2. **Work caudad to cephalad** — treatment should start at the apex of the sacrum to desensitise the skin area which is reflexively linked to the parasympathetic nervous system (the "Bladder zone", as the bladder has a parasympathetic nerve supply). This reduces sympathetic activity and starts to rebalance the autonomic nervous system in the desired direction. It also reduces potential unwanted reactions, which, if the principles are not followed, can include dizziness and sweating, fainting, extreme tiredness or irritability and restlessness. These effects are often delayed and may occur when the therapist is out of access, so must be avoided. They are most likely to happen if the skin over dense sympathetically-supplied areas (such as between the scapulae) is stimulated without first de-sensitising by parasympathetic stimulation.
3. **Work superficial to deep.** It is the shear force applied to deep fascia of the fascial stroke which has the potent autonomic effect and this is the target tissue. However, most patients will have some oedema in the superficial fascia and skin, or some excess skin tension. If this is not dealt with first, the treatment will be painful as this type of skin is often tender to touch. The skin technique can reduce hypersensitivity. Pain increases sympathetic activity so will undermine achievement of the intended outcomes. Uncomfortable sensations may also occur such as itching, dull pressure or a prolonged sensation of the treatment strokes for several hours post-treatment. These can be avoided by clearing the skin of excess fluid and tension before moving to deeper layers. The subcutaneous and flashige strokes are used for this purpose.
4. **Target appropriate tissue interfaces to stimulate the fascia.** The strokes are undertaken in specific patterns. These patterns correlate to places where the deep fascia lies under the skin, rather than under muscle. This enables the fascia to be targeted at the correct tissue interface, so reducing unwanted reactions and also ensuring that the clinical effects can be produced in as few treatment sessions as possible, as this is