Critically Appraised Paper: Zusman M. There’s something about passive movements,...Medical Hypotheses; 2010 (In press)

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Title

Perhaps a more suitable title would be: “From the cell to the body: possible biological mechanisms for passive (therapeutic? see below) movements.” (¿). There is surely something in passive movements as we all know as clinicians and as previous research has shown. The current title may imply that before we discovered cellular mechanics, there was nothing in (or about) passive movements...

Introduction

"It would be a sad state of affairs for the physical therapy profession if, a decade into the 21st Century, it still needed to fall back on the evasion that ‘absence of evidence is not necessarily evidence of absence’ in order to justify the use of its passive movement procedures as Hurley and Bearne suggest."

I believe that because there seems to be a lack of clarity amongst

The recognised (funded) stand-alone clinical status for therapeutic methods of passive movement has become increasingly threatened in recent times as the preference for active treatment (specific exercise) gains hold. This is in part due to the equivocal results for clinical trials of passive movement, queries regarding its cost-benefit and negative findings for many of the fundamental claims and recommendations of its clinical process. Linked to these issues has been the profession’s difficulty in demonstrating plausible science-based mechanisms for anything more than transient effects. The present proposal is that the manual application of graduated oscillatory tensile loading to healing (or unhealed) soft tissues in the form of passive movement could facilitate optimal repair and tissue integrity (and so protection against subsequent ‘stress’). The mechanism depends on the intrinsic ability for non-excitable connective tissue cells to ‘sense’ mechanical stimuli and to transduce mechanical into chemical signals. This leads to gene transcription and subsequent adaptive remodelling of the extracellular matrix (ECM). An outline of these events is given, emphasising their dependence on the effective interplay between internally (cellular) and externally (matrix) generated mechanical forces. In principle, it ought to be possible to investigate the proposal and other clinical passive movement issues using modern soft tissue imaging and biological techniques with suitable human subjects and animal models.

The author provides a constructive critique of the published paper by Zusman, adding valuable opinions from his experiences and published works.

Key words: passive movements, critical appraisal, journal club, critical reading.

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physiotherapists all over the world regarding what is defined or considered as 'passive movement' or 'mobilization' that it should be defined from the start. Are we talking of the traditional 'accessory' movements of the peripheral joints or the spine? Physiological movements? Are we dealing with soft tissue mobilization techniques? Any form of massage which is considered by some as 'movement' or 'mobilization'? Or neurodynamics? And so on. Needs to be defined clearly.

There are also other relevant questions to the contents of this article: Are passive movements really passive? Perhaps, but only when a patient is anaesthetized. If they are not (and there is always some EMG activity of the muscles even at rest), then the paper should refer to ‘therapeutic movements’ performed by the therapist (while taking into account that the patient is somewhat ‘active’) or movement performed solely by the patients without any assistance by the therapist and so on.

The words "progressive tensile loading or gradual stretch" are used in many occasions in the text. It should be noted that 'passive' movements can also be performed in 'mid-range' where no resistance is present and therefore no stretching occurs. Again, a definition of what is meant by passive movements would help to clarify things.

Donald Ingber mentioned in one of his papers\(^1\) that the concept of cellular mechanics and mechanotransduction refers to any kind of movement including physical activity. Therefore, my opinion is that the paper deals with any kind of movement not just passive movements. Perhaps (and probably likely), the response of the cell, nervous system or the entire organism might be (very) different in passive vs. active movements as it has been shown in imaging studies of the brain.\(^2\)

"Nowadays justification for the use of passive procedures appears to be where this is intended to pave the way for currently favoured ('evidence-based') active therapeutic strategies."

I would add to the (blind) emphasis on evidence-based procedures (and also pressure from the part of stakeholders and funders of health care), the neglect of clinical reasoning in favor of, for example, 'clinical prediction rules' (as the author stated). I believe this is an important issue in the light of "the notable return to earlier dogma". This "currently favoured evidence-based active strategies" would not have happened if a clinician would use sound clinical reasoning with knowledge from basic sciences (of course, with knowledge from many domains). Passive movement would have been included in treatment because the clinical situation requires it (for example, a stiff joint following a healing fracture or as a result of osteoarthritis).

"In the case of ‘mobilisation’, its founders simply adapted a well known and naturally utilised physiological phenomenon, progressive tensile loading or graduated stretch."

Again, not completely true. There some types of mobilization that do not include stretching, for example grade I in the Maitland concept. A broad and general definition would help.

"The present discussion focuses on one such mechanism: the intrinsic sensitivity and response of ‘apparently’ would be a more accurate word\(^3\) non-excitable (connective tissue) cells to mechanical stimuli such as stretch, pressure and shear/gliding.

Science vs. empiricism

Ref 37 is Maitland's vertebral manipulation. Just to make justice with Maitland.

"In many cases any mention of possible mechanisms, therapeutic and to a large extent pathological, was strictly avoided" is not accurate. Maitland's permeable brick wall suggests using medical and scientific knowledge in order to explain clinical phenomena where it is possible. A good example is the "slump test" and the article by Maitland on "positive canal signs" where he tried to find a ('evidence-based') pathomechanical rationale behind the Slump test.\(^4\)
Physiological mechanism

The reader who does not remember cell biology/architecture and mechanics will simply leave out the article. I think that (unfortunately) not many professionals remember what ECM, microfilaments is and so on. There are a lot of terms that are probably new to many readers. Therefore, I believe that a very brief description or better a schematic drawing of the cell and the components that are relevant to the discussion would be of assistance to the reader. And perhaps drawings that explain the concepts presented in the article would also help.

Conclusions

"Where this is not feasible e.g. the spine, specific active movements may be substituted. Either could be expected to deliver regular therapeutic mechanical stimulation/tensile loading to repairing and strengthening connective tissue".

Self-mobilization of the spine using passive movements may be applied by the patient using devices such as ‘bakballs’ (www.bakballs.com).

References


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Other Information

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Conflicts of Interest

None declared.