

# Disorders of joint play – theoretical basis for examination and therapy

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**Joint play**

**Factors affecting joint play**

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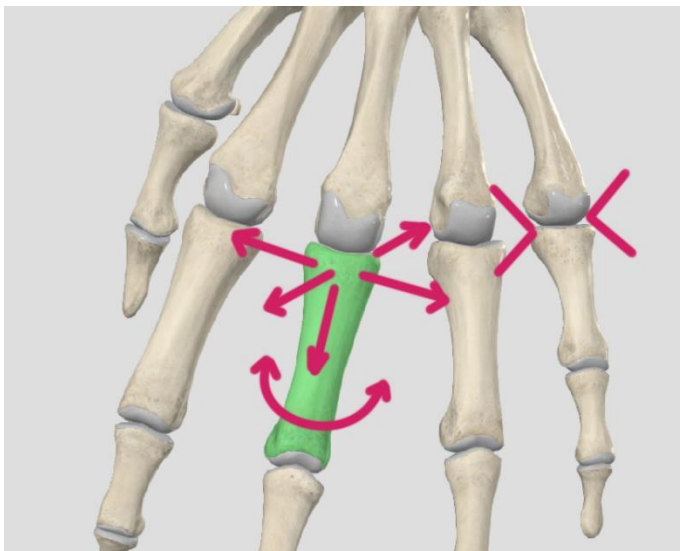
**The meaning of the terms structural and functional in joint play disorders**

**Examination of joint play**

**Techniques to correct limited joint play**

**Joint play**

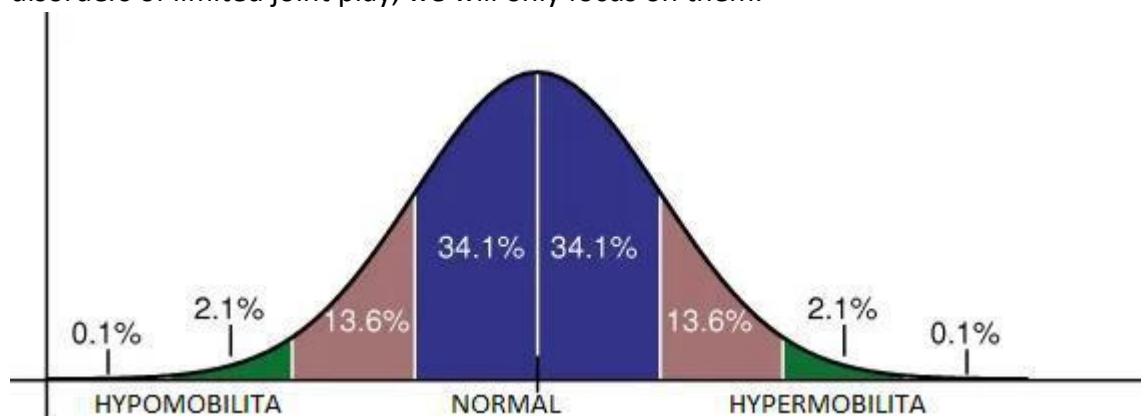
It is a well-known term, it is about passive movements of joint segments that we cannot actively perform in the joint, unlike functional movements such as flexion, extension, etc. The basic movements of joint play are shifts in possible directions in the sense of movements mostly perpendicular to the axes of the segments. These shifts are conventionally referred to as the direction of movement of the distal segment relative to the fixed proximal one (cranial versus caudal on the spine). For example, palmar displacement of the distal phalanx relative to the middle. The next most common movements are angulation and distraction. Physiological joint play is a prerequisite for physiological movements of the limbs and spine, both passive and active. Its disorder is often accompanied by pain or incoordination of functional movements without being clinically significantly limited.



## Factors affecting joint play

The basic parameters of the range of joint play are determined genetically, by the elasticity of the connective tissue. This factor is usually applied in a generalized way and is subject to the Gaussian curve rule, and therefore the majority of the population moves in medium values, and only in the marginal parts can we evaluate joint play as pathologically increased or decreased. Structures that primarily affect the range of joint play are the joint capsule, ligaments, or retinaculum in some peripheral joints. Muscles in a relaxed state limit joint play to a minimum. Physiologically or pathologically, joint play is affected by the shape of the joint. This means that, according to its shape structure, each joint has the directions of joint play given, and they can be pathologically affected by genetic (dysplastic) or "degenerative" and post-traumatic changes, both in the sense of their limitation of movement, or, conversely, of movements that are not physiologically possible

Since the therapeutic techniques of manual therapy are exclusively interested in disorders of limited joint play, we will only focus on them.



## Causes of limited joint play

There are two basic reasons for the limitation of joint play.

The first, probably easier to explain, is the restriction of connective tissues. A decrease in their elasticity is most often caused by immobilization of the segment, mostly in all possible directions. Another similar cause, but not so radical, is movement "poverty". Practically, this means that some functional movements are carried out minimally and the connective tissue around the joint is restricted in only some directions.

This can occur due to insufficient or one-sided movement activity or based on restriction of movement due to nociception (pain) of various etiology. A characteristic feature is that, due to these reasons, joint play is gradually reduced. This cause and type of limited joint play is typical of peripheral joints, especially after immobilization. In most cases, there is no acute pain in the segment and its surroundings, and there are also no significant reflex muscle reactions.

A not fully understood factor that could limit joint play is a change (increase) in the viscosity of the joint fluid during immobilization. This effect on the lubrication capabilities of a similar fluid between the fascial layers has been proven, so the effect of the joints is also likely.

The second cause is an event that takes place much more quickly and is best explained by the theory of meniscoid entrapment. This process occurs most often during sudden movements, but apparently also during prolonged positions and also as a result of viscerosomatic chains.

## Clinical manifestations of joint play disorders

The first type of "blockages", are typically on peripheral joints and usually do not have significant reflex responses. If they are very painful, they are most likely neurovegetative symptoms. Myofascial reflex concatenations are not typical for them (if we find myofascial findings, then primarily as a result of fixation, etc.).

The second type of blockages, explained mainly on the basis of meniscoid narrowing, occurs mainly on the skeletal axial organ, i.e. the joints of the spine, ribs and pelvis. Significantly less on the peripheral joints, and if so, it most often affects the elbow joint, wrist, ankle, and leg joints other than the toes. Another probable cause of blockages is a reflex pathway similar to, for example, HAZ, i.e. dysfunction of an internal organ.

These blockages can be divided, just like trigger points, into latent and active. Latent blockages are probably present in most people permanently without felt subjective sensations. Active blockage (subjectively perceived as a limitation of functional movements and pain) can be caused by the activation of a latent blockage, e.g. by a cold, virus etc., or directly, most often by rapid movement. It is accompanied by reflex changes especially in the muscles – trigger points or in an acute state protective spasms.



Meniscoid

## **The meaning of the terms structural and functional in joint play disorders**

Joint play is a factor that we can investigate in general. It is independent of causes. Concepts such as functional blockage or structural rigidity are not always clearly defined and are often intertwined. Is the post-fixation limitation of joint play functional or structural? It is functional in that it is mostly reversible and no clear structural findings are present during examination by imaging methods. However, it is proven that the elasticity of the joint capsule and ligaments is reduced by changes in collagen fibers, changes in the density of hyaluronic acid and others. If these changes reach a certain limit, they become permanent. On the other hand, changes in articular cartilage in the sense of arthrosis, if they are not accompanied by inflammatory changes in the joint capsule, ligaments... or osteoproliferative changes, may not have any effect on joint freedom.

Joint blockage due to meniscoid encroachment is clearly a mechanical and therefore structural disorder, but it can usually be corrected spontaneously, possibly with the help of therapeutic techniques.

In the light of these facts, I would be in favor of getting rid of terms such as therapy for functional disorders, etc. In terms of the possibilities and methods of therapy, it would be more appropriate to use terms such as joint dysfunction quickly reversible, gradually reversible or irreversible.

## **Examination of joint play**

This examination is described in detail in many works, we follow the procedure of prof. Lewit, this means that we do not evaluate the joint play disorder according to the quantification of this movement, but according to the nature of the barrier that we feel after springing from the preload (pretension, first stop...). In other words, we do not measure the length of the path to the preload, which can be quite different according to the Gauss rule, but only the hardness or softness of the impact (springing) after the subsequent jump into the barrier. I would say that the rule applies without reservation to blockages with a presumed cause by meniscoid. In the case of disorders of joint play, arising, for example, after fixation, the impression during the examination is usually a little different. We can perceive well (and usually judge by comparison with the other side) that the resistance and the amount of movement is smaller in the affected joint, and on the contrary, the hardness of the stop after springing from the preload is not as clear as in the first type of blockage. It doesn't have to change anything about the way this examination technique is performed, we should just respect this fact and explain this difference in the perception of different types of joint play disorders during teaching.

Joint play can be investigated to a greater extent in peripheral joints, although not always in all possible directions. With the joints of the spine and ribs, this is impossible, except for technical reasons. Here, we investigate most often functional movements, e.g. extension, targeted at one segment. Experience from the examination of the cervical spine shows us that if we find a pathological barrier in one of the functional directions, there is often a disorder of the joint play of this segment, we can also assume this in the case of the thoracic and lumbar spine, but we cannot prove it.

## **Therapy**

For joint therapeutic techniques used by prof. Lewit general name manipulative treatment, they are divided into mobilization and thrust techniques. We then teach mobilization in different ways, depending on the nature of the blockade. I have tried to do some revision of these techniques and their use, especially based on new knowledge about connective tissues.

### **Repetitive mobilization**

The technique most often used, in the basic version of repeated springing in the direction of the barrier from the achieved preload (first stop), for selected joints (where we want to use the spring effect and we do not have the technical possibility of springing in the opposite direction), we use the variant of releasing the preload. This technique is used especially where we can treat joint play in the direction of movement, i.e. in peripheral joints, that is, in particular in the case of a gradually arising limitation. It is hardly used on the spine and ribs, except for the pelvis.

Shaking technique a variant of the previous technique with a faster rhythm.

### **Mobilization by holding in preload (pretension)**

This is mainly learned in connections where a greater proportion of soft tissues is assumed, such as the movement of the fibula, mobilization of the metacarpals or metatarsals. However, connective tissues play a critical role in joint play in each joint. However, this technique is especially suitable for gradually occurring faults. It is always an alternative to repetitive mobilization, probably more effective, since the greatest effect on the elasticity of the binder is shown when the stretch lasts at least one minute. The repetitive technique used for the joint, when the joint play is limited by the restriction of the capsule and ligaments, does not have such a rationality, yet it will be preferred by most therapists because "something happens" with it.

### **Mobilization by postisometric relaxation**

This technique is mainly used on the joints of the spine, i.e. for mobilization in the direction of functional movements, where a large participation of the muscles is assumed. However, it is actually mobilization by possession in pretension enriched with elements of postisometric attenuation and respiratory synkinesis. PIR is not the essence here, but an auxiliary element.

### **Thrust (high velocity) technique (according to Lewit)**

It is also performed from a pretension by a quick movement of a small range and force, often accompanied by a sound phenomenon - snapping. Lewit describes in his book that it is a movement in the direction of the barrier, but most of us know that he taught, recommended and performed, for example, in the ThL transition, a bump in the free direction.

This type of technique makes sense to perform in the case of disorders where we assume a possible quick or immediate correction, that is, blockages based on the hiding of the

meniscioid. My experience is that with these types of blockages, especially in a more acute form, repetitive mobilization or even impact in the direction of restriction is not very effective and difficult to implement (for inducing pain). A suitable example was used by prof. Lewit, when he compares a blockage to a stuck drawer, and the way to open it does not lead directly in the direction of the restriction, but through various movements that release the movement. The direction of these movements leading to release is not even for such a clearly defined anatomical structure as a drawer, and the path to its release may be different, it is only obvious that the fault is impatience and anger, which the drawer or will damage the body. Also, the procedures that release the blockage (meniscoid) can be different and I have seen and tried completely different methods that have one thing in common, they do not cause pain and the position in pretension allows sufficient muscle relaxation. An example can be pure traction techniques, e.g. on Th and CTh segments. Another procedure that Lewit describes on the cervical spine is the locking of the segments on the patient (by rotation, lateroflexion, extension) and the impact is mainly performed in the direction of traction. With osteopathic techniques, I have seen and tried maneuvers where pretension was created by a combination of movements into extension, lateroflexion, rotation and compression (as if the segment was tightening) and rotational impact. Prof. Kolar performs the release of the blockage on the cervical spine by looking for a position of pretension, a combination of movements into lateroflexion, rotation and extension, and the barrier somehow releases itself in a situation of perfect relaxation. As I have already said, there are many procedures to release the blockage and it is often not easy to describe them in exact technical terms. The common principle is movement (mostly faster and of small amplitude), or waiting in a bias that "frees" the meniscoid. The sound phenomenon of peeling is a positive symptom, but it should not be the goal, since successful therapy may not always be accompanied by peeling, and the pursuit of it often leads to the use of excessive force. The amount of force that these techniques use, or rather should use, leads me to consider changing the terminology. The term "impact" techniques too evokes the concept of power, while the principle of techniques that use movement in the barrier is in speed. The concept of manipulation is probably more general than this joint technique. Mobilization with an impulse seems to me to be an adequate name.

### Meniscal changes before and after therapy

