



Yoga therapy for the spine. Traction techniques.

by Artem Frolov

Traction techniques play an important role in yoga therapy for spine disorders, especially for intervertebral herniation. The term of «traction» means the process of stretching or impacting the spine (or a separate segment of musculoskeletal apparatus) by applying to it two forces working in opposite directions. Such forces can come from gravity, the patient's muscular strength or an external force (by applying weight or an assistant's help). Traction results in a decreased pressure in intervertebral disks, an increased diameter of intervertebral foramen, with nerve roots running through them, and stretching of muscles and ligaments of the spine.

It is important to understand that a commonly used term «stretching», commonly used in yoga circles, does not always refer to real traction. For example, so called stretching of the vertebral column in *tadasana* does not have anything common to do with traction; *asana* alignment, elongating upwards through the crown of the head can improve the overall configuration and geometry of the spine and its curvature. But the weight of the head still induces pressure on the cervical spine and shoulder girdle; the head and the neck – to thoracic spine; all of the above plus the thorax — to the lumbar spine. The spine continues to experience the natural load, with no active mechanical stretching taking place, which is why this technique does not constitute traction.

Real stretching or traction has a favorable influence in cases of intervertebral disks' pathology. There are many reports on the repositioning of nucleus pulposus by means of stretching (J.Matews, 1972, R.Gupta, S.Ramarad, 1978 and others). Increasing the force stretching the spine (or increasing the weight of the pulling load) leads to a proportional decrease of intervertebral pressure. This process continues while the weight of the load does not exceed 17-20 kg; a greater weight results in a reflexive generalized tension of the spinal muscles (Ya.Yu. Popelyansky).

Monitoring by means of CT scan imaging has shown the reduction in prolapse by 2-2.5 times in half of the patients who underwent traction and a decrease in spinal root edema. (G.A. Akimov, P.A. Kovalenko, 1985).

A research that compares two groups of patients with chronic pains in lumbar spine shows that the group whose treatment had included exercises, physiotherapeutic treatment and traction got better results than the group that had only engaged in exercises and physiotherapy (A.A. Diab, I.M. Moustafa, 2013).

The effect of the traction treatment is worse in cases of sequestered herniation (Tsvivan Y.L., 1975). It is to be expected, as the sequestered disk, which has lost its structural connection with the main pulpous nucleus, cannot be «reinserted» into the intervertebral space during traction.

According to Ya.Yu. Popelyansky, «...radicular pains are eliminated in many patients as soon as traction begins...». Neck and lumbar pains often disappear due to traction, which must be related to a reduced pressure by the herniation to the posterior longitudinal ligament.

There are three modes of action. The first is mechanical; the most self-evident, this version is studied better than the others and has substantial empirical corroboration (see above).

Stretching of the spinal segment increases the distance between vertebral bodies and thus lowers intervertebral pressure, increases the gradient between the herniation and the main part of the intervertebral disk, which aids in the retraction of the prolapsed part of the nucleus pulposus; the height of intervertebral space and the diameter of the vertebral opening are increased, thus reducing the pressure on the nerve root.

The second type is reflex traction: stretching of the spine works on mechanoreceptors of the disks, ligaments, muscles and joints, which largely determines the effects of traction (B.D. Wyke, 1975). Spinal traction does not only produce a mechanical stretching effect, but also affects the receptor apparatus of the spine, which changes relations between different parts of the neuromuscular system, the motor zones of the spinal cord and brain, and the regulation of peripheral blood circulation and muscular tone.

The third type involves impacting intervertebral joints. Joint capsules have inner layers – meniscoids. The inside of the joint cavity is covered with a so-called chondro-synovial gelatin membrane, thin and slippery. Its sponge-like honeycomb structure contains synovial liquid (J. Kos, 1968, H.A. Chudnovsky, R.L. Zaitseva, 1986). In cases of polyarthritis, this membrane is damaged, before any damage to the cartilage. In cases of osteochondrosis, there can be a displacement of meniscoid into the joint cavity, or its detachment, sequestering and pinching of the fragment between the segments of joint cartilage; this leads to joint blocking and compromising of its normal mobility (K. Levit, 1973). Traction can reposition the meniscoid back to normal, which leads to a temporary cessation of pain or a prolonged remission (D. Yung, H. Bavermeister, 1984).

Thus clinical improvement by using traction can be achieved through mechanical stretching of the spinal structure, reflex impact on the muscles and ligaments, as well as improvement (releasing) of intervertebral joints.

In modern vertebrology traction is usually performed using specialized means: traction tables, weights, water traction in a special tank, and others. Yoga therapy is geared towards self-assistance with minimal reliance on special means. We will now discuss yogic techniques anyone can do at home.

Ardha bhujangasana (a half cobra pose) — traction of the thoracic and lumbar spine (Fig. 1). Start by lying down on your stomach, bend your arms and place forearms on the floor parallel to each other. The elbows are on the floor right under the shoulders or a little bit closer to the pelvis. In this position, there is no bend to spine: it forms a straight line, from the sacrum to the top of the head (do not lower or tilt the head back, it should be a continuation of one straight line with the spine). From this position, execute pulling movements with your arms, as if trying to «pull» the floor in under you. Shoulders slowly move forward; the spine stretches forward along with the shoulders. You should start with the dynamic version: shoulders slowly move forward; the spine stretches and pulls the pelvis and legs along, so that they slowly move forward following the shoulders. Having pulled your pelvis a few centimeters forward, move your hands further forward and repeat the routine of pulling the rest of the body along. Repeat the sequence several times; it is better to do this exercise on a slippery floor, rather than a yoga mat. The static version is done by starting in the same initial position: «pulling» the floor in under you, moving your shoulders forward and thus stretching the spine between the shoulders and the pelvis, but not quite to the point where the pelvis would move, and stay in this stretched position for a while. This version can be accompanied by slight movements of the shoulders from side to side, while the spine remains stretched (Fig. 2). Remain in this position for 1-2 minutes or do a series of shorter reps.

In this traction exercise, the spine is stretched along the axis with the help of two opposite forces — forward movement achieved by working the shoulder muscles against the pull of gravity on the pelvis and lower extremities.

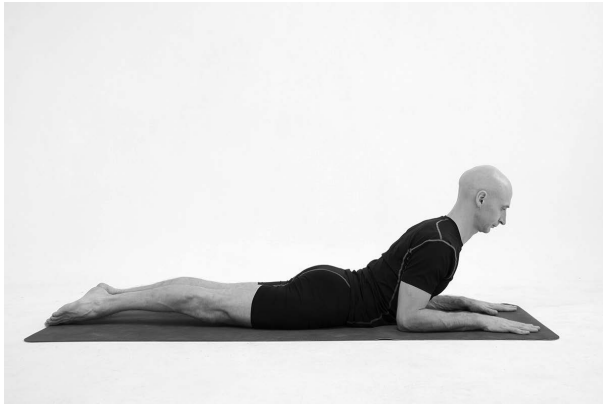


Fig. 1a



Fig. 1b



Fig. 2

The traction of the cervical spine while- lying on the stomach specifically targets the neck (Fig. 3). Lie down on your stomach, stack your hands on top of each other under the throat, palms down, thumbs pointing down towards the chest. Elbows are symmetrically jutting forward. The chin is placed against the sides of your hands. Do not tilt the head back. As much as possible, aim the crown of the head forward, with the neck parallel to the floor. Sometimes, the nose may touch the floor; in this case you should move your palms forward for by 1-2 centimeters. In this case, the chin serves as the fulcrum. Lightly flex your nodding muscles (sternocleidomastoid muscles) and press the chin against the knuckles, relaxing and stretching the back of the neck. Relax the face and breathe normally. Stay in this position for 20-60 seconds.

After performing this static version, move onto its dynamic counterpart: softly pressing the chin into the knuckles of your hands, roll your head from side to side. Relax the back of the neck. Make rolling movements with the head for 2-3 minutes.

In this traction, the stretching force is the gravitational pull on the head and the work of the nodding muscles of the neck versus the gravity pulling on the chest and the whole body on the other.



Fig. 3

Traction of the cervical spine can also be done in a sitting or standing position by means of the chin pressing against the fist placed between the chin and the breast bone (Ya.Yu. Popelyanski, 1997). As an option, you can use a soft block instead of the fist (Fig. 4 and 5).



Fig. 4



Fig. 5a



Fig. 5b

Traction of the thoracic and lumbar spine in the majariasana modification starts by standing on your knees and elbows, with elbows planted against the knees (Fig. 6). The spine is straight, without arching in either direction. Head is neither lowered nor tilted back, with the neck and the head aligned into a straight line with the spine. From this position slowly move your torso alternately forward and backward in a movement resembling pulling on a rope, stretching forward with the crown of the head and backward with tailbone. Hands and legs are continuously tensed, the spine is stretching between the shoulders and the pelvis. The movement is slow, almost imperceptible, involving perpetual isometric impact.

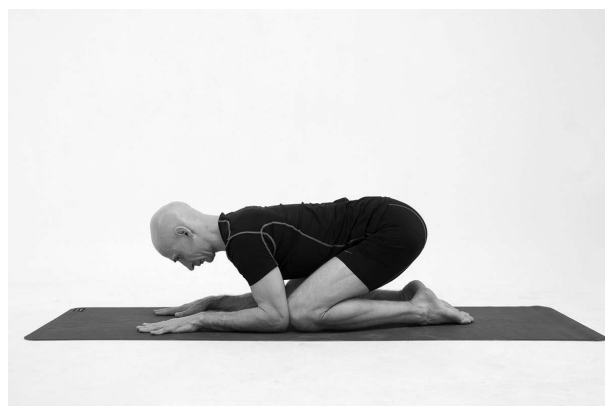


Fig. 6

The dynamic version of adho mukha virasana Start in adho mukha virasana (shashankasana, ardha kurmasana): the knees, shins and feet are on the floor, the pelvis rests on the heels. The knees are slightly apart; the arms are slightly bent at the elbows; the forehead and forearms rest on the floor. If due to muscular stiffness the pelvis cannot be set on the heels, place a bolster or a rolled up blanket between the buttocks and the ankles. If the forehead cannot reach the floor, prop it up on a small cushion. As you inhale, raise the pelvis over the heels (by 20-30 centimeters), slide the fingers forward (Fig. 7). As you exhale, slowly lower the pelvis into its initial position, while the fingers of «grip» the floor and move slowly along with the pelvis, this lightly resisting the movement (Fig. 8). The spine is stretching between the shoulders and the pelvis. Repeat the sequence for 10-12 times.



Fig. 7a



Fig. 7b

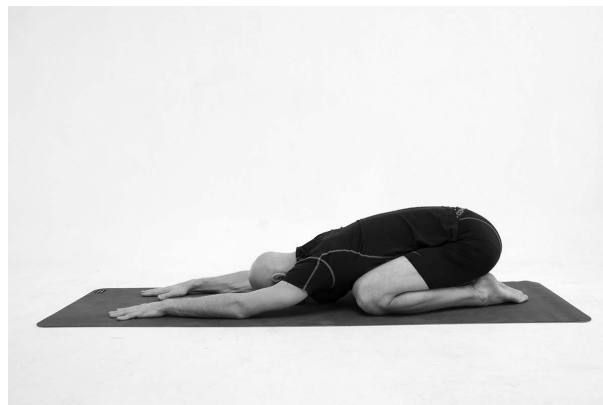


Fig. 8

Some traction techniques can be made more effective by enlisting the help of an assistant (yoga therapist):

Traction with kyphosis exercises for lumbar spine in adho mukha virasana

The starting position is adho mukha virasana (see the above description).

This traction technique has several stages, involving gradual increase of the intensities of the impact. The first stage: the assistant gently (!) presses his/her palm against the lower part of the sacrum, thus kyphosing the lumbar (Fig. 9). The second stage: the assistant provides a similar kind of impact by gently sitting down on the lower part of the patient's sacrum; the assistant should not put the entire weight of his/her body, but carefully control the amount of the impact, keeping his/her legs engaged (Fig. 10). The first and second stages mostly provide kyphosis of the lower back. The third stage delivers traction along with the kyphosis effect. A patient interlaces his/her fingers and places his/her hands on the lower third of the assistant's right shin, while keeping the arms straight at the elbows. The assistant keeps his right leg straight, with the heel raised above the floor. The left leg is set forward and bent at the knee. The assistant places the

heels of his palms on the lower part of the patient's sacrum. The patient takes a deep inhale and a prolonged exhale (it is best to use ujjayi breathing). During the exhale, the assistant softly presses on the sacrum, while lowering the right heel to the floor (Fig. 11 and 12). The patient's spine is thus stretched between two points — the sacrum (secured in place by the assistant's hands) and the pectoral girdle (stretched by the movement of the assistant's right heel).

In this case, traction is combined with the kyphotic impact on the lower back.



Fig. 9



Fig. 10



Fig. 11



Fig. 12

If you have wall bars (or hooks in the wall), you can use the following types of traction:

A traction version-of adho mukha shvanasana using a belt. You will need a belt tied to a wall bar at the height of a door handle, or attached to a hook in the wall at the same level. The belt is placed across the pelvis at the groin level; the patient's heels are on the floor set against the base-board or planted against the wall. If possible, straighten your legs at the knees, although it is acceptable to have them slightly bent. Extend your arms in front of you as far as possible; relax your neck. The traction comes from the weight of the body (Fig. 13). Hold this position for 1-3 minutes.

If you have an assistant, s/he can increase the traction effect by grasping the patient's wrists and softly pulling on the patient's arms (Fig. 14); the patient should completely relax during this procedure.

Traction version of utkatasana – You will need a long belt attached to the top wall bar (or a hook at the same height). Put your feet together and bend your legs at the knees and hip joint. Grasp the belt, keeping your arms straight, so that the arms and the torso down to the pelvis form a straight line continuing that of the belt. Knees are over the feet or a bit forward. The pelvis «hangs down» and stretches the spine. Dynamic movements of the pelvis along the hip joint axis enhance the traction effect: the tailbone moves forward (kyphosis of the lower back, Fig. 15),

then backwards and upwards (lordosis of the lower back, Fig. 16). The degree of the effect on the lordosis of the lower back depends on its expression in each patient and the set objectives of the yoga therapy.



Fig. 13



Fig. 14



Fig. 15



Fig. 16

In this technique, the traction of the lumbar and cervical segments of the spine is achieved by applying the weight of the patient's body. There is also an option to combine stretching and with correction of the lower back lordosis.

The traction effect and its degree depend on the activity of rectifier muscles of the spine and small paravertebral muscles (interspinal, intertransverse and others). The work of these muscle groups reduces the distance between the vertebrae, securing them against each other and thus decreasing the stretching potential of the spine (i.e. some specialists believe that traction becomes less effective). In the above examples, these muscle groups are activated, first of all, in adho mukha shvanasana or utkatasana. Complete relaxation of the back muscles can be achieved in ardha bhujangasana and adho mukha virasana when performed with an assistant. Clearness in this question may only be gained with the help of objective researches. In any case, in choosing and performing any traction exercises, the main focus should be made on a complete relaxation of the spinal muscles.

In the described examples, lower back traction was combined with kyphosis exercises. Some techniques involve spinal traction combined with lordosis exercises for lower back (bad-

dha-konasana in a hanging position using a belt). This type of traction is believed to be better suited for cases of intervertebral herniation combined with decreased lordosis («flat lower back»). The practical experience of using traction in combination with lordosis exercises for the lower back may suggest the likelihood of clinical worsening of the situation. Furthermore, some authoritative sources (B.L. Dubnov, 1967, Ya.Yu. Popelyansky, 1997) have indicated that traction may not be desirable in positions involving the unbending of the spine. Most authors point out the benefit of stretching in a pose habitual for a patient or in a pose of slight kyphosis of the lower back (Yu.I. Krasnyansky, 1967; A.F. Kaptelin, 1972; G.E. Buldakova, 1973; and others).

The process of choosing the traction regimen is also of interest: continuous and steady stretching versus intermittent dynamic type, characterized by a perpetual slight changes in the traction force, regular decreasing and increasing of the impact. Some data suggest that the latter (intermittent dynamic impact) may be more favorable. This involves repeated gentle change of the degree of the stretch throughout the traction procedure, decreasing and increasing it. These fluctuations can either follow the rhythm of the patient's breathing (with an increase on an inhale and a decrease on an exhale) or use longer cycles. In general, «brief, localized and carefully controlled tractions targeting a certain segment of the spinal column are the most effective» (Ya.Yu. Popelyansky).

The force of the traction requires thorough and careful application. At vertebrological clinics, traction is performed by means of special equipment that allows to measure the force of stretching with accuracy down to one kilo. Yoga therapy does not have such capabilities; this is why you should start with a minimum intensity, gradually increasing the degree of the stretch, guided by how the patient is feeling before and after the traction as the main criterion. The time of the exposure should also be increased gradually across sessions, starting from 30-60 seconds and building up to 4-5 minutes.

Care and circumspection should be exercised at all times, because traction may lead to negative results. An excessive tension (for example, hanging on a chin-up bar where the spine gets too much weight) may lead to a reflex spasm of the paravertebral muscles, increase of nerve root compression and pains. Besides, as practice shows, in a small percentage of cases such negative reactions may be caused by very slight tractions. Sometimes an increase in pain at the beginning of a traction routine can stem from an acute spastic reaction of the muscles of the lumbar spine; this does not require an immediate cessation of the traction therapy, but rather requires a more gradual increase of the impact and — very importantly — a preliminary preparation of the back muscles (Ya. Yu Popelyansky); in yoga therapy, this preparation would primarily consist of a dynamic practice. That is why traction should be done at the end of the therapeutic yoga regimen.

A great number of authors speak favorably of therapeutic effectiveness of various types of stretching, reporting a high percentage of improvements: 67-98% (O. Troisier (1962), P. Ravault, E. Maitrepierre (1960), M.A. Farber (1970) and others). But among a small group of traction patients (4%) exhibited negative outcome. The worst results are noted in cases of sequestered herniation.

Negative side effects can be avoided by gradually introducing traction techniques and by gradually increasing impact. Of course, it is important to consider any contraindications.

Contraindications for traction techniques

1) Hemangiomas of the vertebrae. Nowadays, these benign tumors are often discovered through MRI imaging and are usually asymptomatic. However, in some cases, hemangiomas can lead to a number of serious dysfunctions of the spine column and spinal cord. There is a written report describing a patient with a lumbar hemangioma who became paraplegic (paralysis of the

lower half of the body) as a result of traction therapy (Y.L. Tsivian, 1975). The report gives no information about the location and dimensions of the hemangioma; nor is there any mention of premorbidity details (i.e. from what other conditions apart from the degeneration of the intervertebral disc and hemangioma the patient suffered) or information on the magnitude of the traction force applied. It is possible that the patient had a large hemangioma, located close to the edge of the vertebra. It is also possible that the condition was compounded by osteoporosis, which combined could lead to such adverse effects.

In practice, the complications discussed above occur quite frequently in cases where a vertebral hemangioma is concurrent with spinal disc herniation. Slipped discs are an appropriate occasion for the use of traction techniques (note that a positive effect is observed in 96% of cases), though the use of traction techniques in the presence of hemangiomas is not such a clear-cut issue.

Among the contradictory aspects of traction techniques, Popelyansky notes the «destructive processes in the spinal column», thereafter citing the hemangioma example. Any tumor (including a hemangioma) disrupting the normal structure of the vertebral body should be considered a destructive process. Here we can look at pathological fractures of the spine, which develop in conditions of osteoporosis, dysplasia, spinal metastasis and a wide range of other conditions, and recall that these fractures occur spontaneously, *as a result of internal pathological processes*. Hemangiomas may also be the cause of pathological fractures and other serious problems.

A group of researchers led by A. Roco (A. Roco et al, 1990) examined five mechanisms of a hemangioma's potentially damaging effect on the spinal cord and the spinal nerve roots: 1) spinal dislocation; 2) deformation and narrowing of the vertebral canal; 3) invasion of the epidural space; 4) fractures of the spine; and 5) epidural hemorrhaging.

It is clear that the larger the hemangioma (as well as the older the person, and the greater the number of comorbid conditions, including such banal ones as postmenopausal osteoporosis), the higher the risk of the complications listed. In certain cases, intervention (including by way of traction) may increase the risk.

However, the majority of hemangiomas remain asymptomatic throughout the patient's life, and traction techniques do not tend to cause any harm, all the more so because in yoga therapy the traction forces applied are, as a rule, very low. This also applies to small hemangiomas located in the vertebral body tissue or the sacrum. As for large hemangiomas located in the vertebral arch or accompanied by disorders of metabolic function or endocrine system, the decision to use traction techniques should be taken in consultation with a spine specialist.

Practical experience shows that a positive clinical effect can be achieved without the use of traction. Taken as a whole, this issue requires further analysis and reviewing of application data. This will allow to develop more definitive criteria on the use of traction techniques and other treatments in case of hemangiomas of various sizes and locations.

2) Sequestered intervertebral herniations (traction may cause further displacement of the sequester and worsen the symptoms);

3) Structural scoliosis;

4) Compression of the cauda equina;

5) Certain complaints serve as signals to cease traction (R. Barbor, M. Camb): first of all, an increase of pain right at the beginning of stretching (this is believed to occur due to the displacement of the sequester); secondly, an increase in pain when traction stops (squeezing of hernia at the moment of vertebra convergence); thirdly, emergence during traction of pain that irradiates into the leg (hernia displacement in the direction of the nerve root).

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