Evaluation of the Forward Bend after Stretching with BLACKROLL®.

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Introduction

In the past few years sports and rehabilitation medicine has focused on how fascia — the superficial and deep band of connective tissue around muscles — can be specifically stimulated with active exercises. It has been found that the shortened fascia are not just a source of pain and limited mobility, but also that the loss of fascial physiological properties is the cause of ineffective rehabilitation, exercise and stretching, as well as poor sports performance. Currently, what has become the dominant training and rehabilitation tool for relaxing fascia is the BLACKROLL® cylindrical roller. Stretching combined with muscle rolling under pressure optimises the metabolic nurturing of fascia and improves its elasticity and range of body motions as well.

Aim Of The Study

Our training and rehabilitation protocol includes stretching with BLACKROLL® which we use to improve the range of motion in athletic performance. The purpose of our study was to evaluate the range of motion in the forward bend, tested on a selective group of football players, while taking measurements with the SpinalMouse® spine detector before and after a training unit.

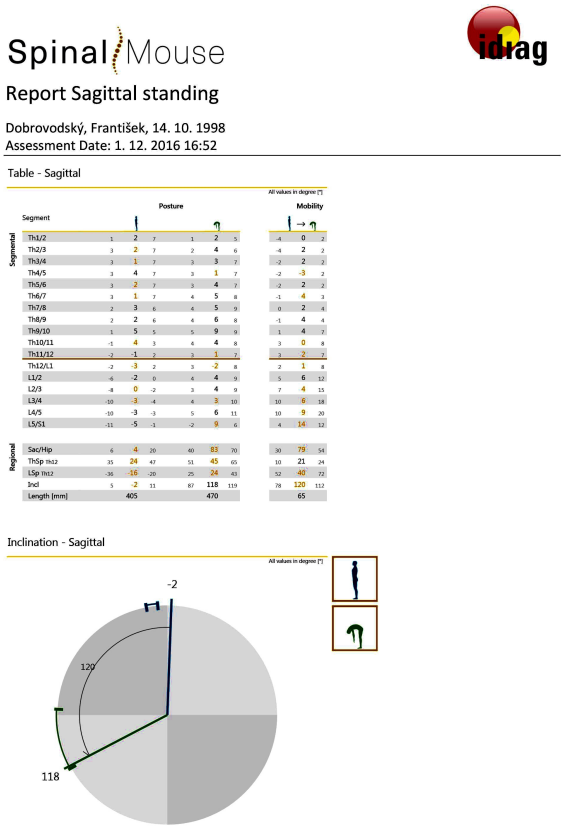
Finger To Floor test

The subjective feelings of athletes after training with BLACKROLL® roller are usually positive. The feelings of undesired muscle stiffness gradually disappear, and the perception of a better range of motion and a more supple body quickly occurs. However, to objectify the achieved results in terms of an improved range of motion is more complex. In this context the most frequent test carried out before and after the exercise is the test of the forward bend with outstretched arms - Finger To Floor test. (Magnusson et al. 1997.) The Finger To Floor test (FTF) is used in the orthopaedic, neurological and rehabilitation propedeutics, as well as in sports medicine. It has been suggested to aim at a fast orientational evaluation of the motion into the forward bend in the sagittal plane. It is measured in centimetres of the distance between the 3rd fingertip and the floor. The test does not contain any normative figures; 0 centimetres is considered the optimal distance.

SpinalMouse®

For the purposes of our study we decided to replace the benchmark of the 3rd fingertip to floor distance with an objective method. Spinal Mouse®, the non-invasive spine detector of the Swiss provenance is a portable computer-assisted medical device that can be used to determine the shape and mobility of the spinal column by simply gliding the device manually down the back. From the superficial shape, an intelligent recursive algorithm computes information concerning the relative position of the vertebral bodies of thoracic and lumbar spine, while taking into account the local curvature kyphotic or lordotic. The working section of the SpinalMouse® extends from the spinous process of the 7th cervical vertebrae (C7) to the spinous process of the 3rd sacral vertebrae (S3). Using recommended procedure first the centre of the spinous process of the 7th cervical vertebrae (C7) is marked, following marking the centre of the spinous process of the 3rd

sacral vertebrae (S3). The working area - distance between 2 marked points - C7 and S3 is then measured first in upright position and next in greatest possible of forward bend. The result is the line of inclination, which represents an imaginary connection between the 1st thoracic vertebrae (Th1) and the 1st sacral vertebrae (S1). The inclination is a measure of the angle between the line of inclination and the vertical and therefore the body's position in the space. Regional lumbar and thoracic values as the sums of each vertebral angle are measured and displayed as well. The measurement of extension of the spine in sagittal plane and both side flexions in frontal plane are also available by the equipment. All the measured data are displayed in both the numerical and graphical form. (FIG.1, FIG. 2, FIG. 3)



SpinalMouse

Report Sagittal standing

Dobrovodský, František, 14. 10. 1998
Assessment Date: 1. 12. 2016 16:52

Table - Sagittal

All values in degree [°]

Segment	Posture			Mobility		
Th1/2	1	2	7	-4	0	2
Th2/3	3	2	7	-4	2	2
Th3/4	3	1	7	-2	2	2
Th4/5	3	4	7	-2	-3	2
Th5/6	3	2	7	-2	2	2
Th6/7	3	1	7	-1	4	3
Th7/8	2	3	6	0	2	4
Th8/9	2	2	6	-1	4	4
Th9/10	1	5	5	1	4	7
Th10/11	-1	4	3	3	0	8
Th11/12	-2	-1	2	3	2	7
Th12/L1	-2	-3	2	2	1	8
L1/2	-6	-2	0	5	6	12
L2/3	-8	0	-2	7	4	15
L3/4	-10	-3	-4	10	6	18
L4/5	-10	-3	-3	10	9	20
L5/S1	-11	-5	-1	4	14	12
Sac/Hip	6	4	20	30	79	54
ThSp Th12	35	24	47	10	21	24
LSp Th12	-36	-16	-20	52	40	72
Incl	5	-2	11	78	120	112
Length [mm]		405			65	

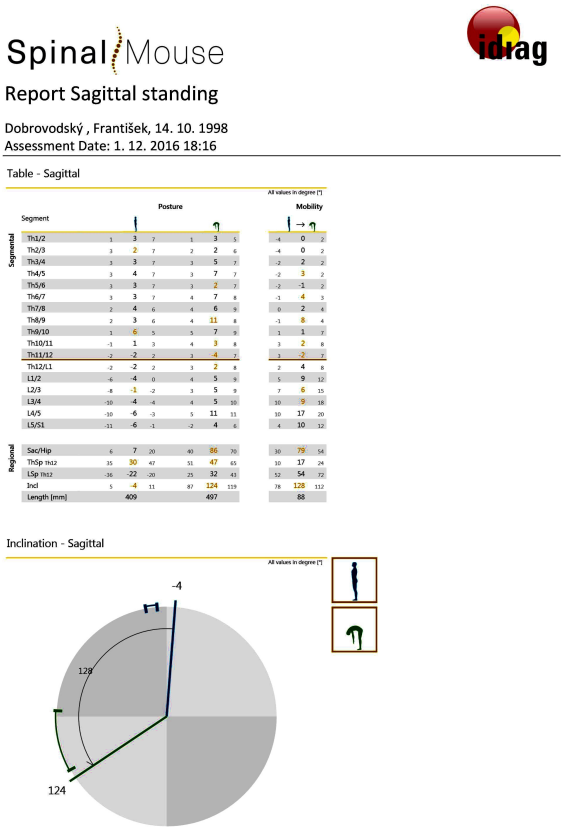
Inclination - Sagittal

All values in degree [°]

-2

120

118



SpinalMouse

Report Sagittal standing

Dobrovodský , František, 14. 10. 1998
Assessment Date: 1. 12. 2016 18:16

Table - Sagittal

All values in degree [°]

Segment	Posture			Mobility		
Th1/2	1	3	7	-4	0	2
Th2/3	3	2	7	-4	0	2
Th3/4	3	3	7	-2	2	2
Th4/5	3	4	7	-2	3	2
Th5/6	3	3	7	-2	-1	2
Th6/7	3	3	7	-1	4	3
Th7/8	2	4	6	0	2	4
Th8/9	2	3	6	-1	8	4
Th9/10	1	6	5	1	1	7
Th10/11	-1	1	3	3	2	8
Th11/12	-2	-2	2	3	-2	7
Th12/L1	-2	-2	2	2	4	8
L1/2	-6	-4	0	5	9	12
L2/3	-8	-1	-2	5	6	15
L3/4	-10	-4	-4	5	9	18
L4/5	-10	-6	-3	11	17	20
L5/S1	-11	-6	-1	4	10	12
Sac/Hip	6	7	20	86	79	54
ThSp Th12	35	30	47	47	17	24
LSp Th12	-36	-22	-20	32	54	72
Incl	5	-4	11	124	128	112
Length [mm]		409			88	

Inclination - Sagittal

All values in degree [°]

-4

128

124

FIG.1 SpinalMouse® Report (Player 1)
Upright posture and total inclination before and after stretching with BLACKROLL®

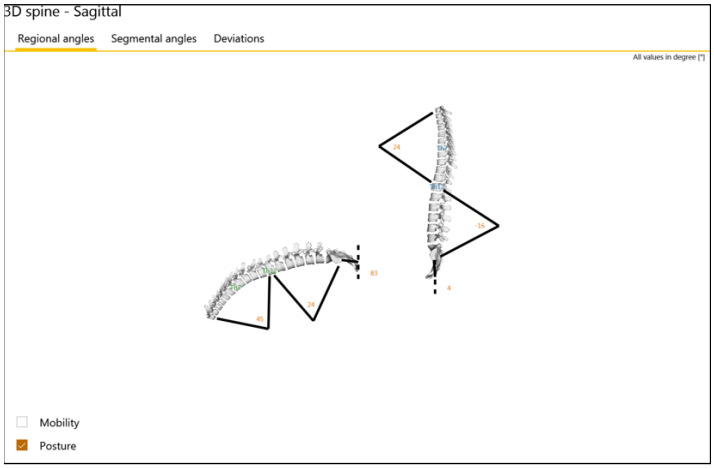


FIG.2 SpinalMouse® Report (Player 1)
Regional thoracic and lumbar values before stretching with BLACKROLL®

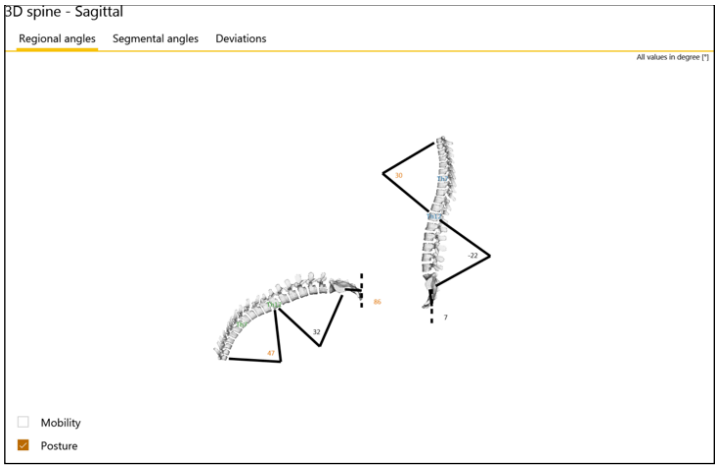


FIG.3 SpinalMouse® Report (Player 1)
Regional thoracic and lumbar spine values after stretching with BLACKROLL®

Method

Eight football players of the FC Artmedia Petržalka - Bratislava, of an average age of 19 years, were randomly selected into the experimental group. Thus the test group consisted of 8 players who underwent a 45-minute stretching programme with a BLACKROLL® Master Trainer. For the first time the players were using a special aid, roller BLACKROLL® Standard type throughout the whole training unit. Before and after the training unit, we measured the 8 footballers' range of motion into the forward bend with their arms outstretched to the floor. For measuring we used the portable, non-invasive SpinalMouse® detector. The measuring itself was carried out in two stages as follows:

At the start, the player stands up straight and is barefoot with his feet about hip-width apart. Distribution of bodyweight is evenly on both feet. The player adopts his habitual posture and his knees are straight. The arms are allowed to hang freely at the sides of the body. His look points directly in front of him.

In the first stage in the straight position we mark the spinous process C7 and S3 with a marker. The position of process C7 is located by palpation of the hand. Anatomical landmark of S3 is marked as a point which is located in the middle, 2 cm below the connecting line of spina iliaca posterior superior. Subsequently, the therapist moves the device from top (C7) to bottom (S3) in the line of process spinosi of the whole spine.

In the second stage, the forward bend is measured - the subject is asked to keep the knees completely extended while flexing the trunk towards the floor, with the head and arms relaxed. The special attention should be paid to whether the body is rolling gently down in segments: head, neck, thoracic spine, lumbar spine and hip joint. The final flexion position is indicated by a sensation of muscular tension causing great discomfort and at this point the measurement of the distance between process spinous C7 and S3 is taken again with the Spinal Mouse®.

Results

The measurements of the range of motion into the forward bend in the 8 players of the test group are shown in TAB.1 and CHART 1. We have registered a considerable improvement of the range of motion into the forward bend in 6 out of 8 players, which equals 75%.

INCLINATION	BEFORE	AFTER	INCREASE
Player 1	118	124	6
Player 2	113	128	15
Player 3	118	121	3
Player 4	116	134	18
Player 5	121	132	11
Player 6	127	128	1
Player 7	116	123	7
Player 8	128	129	1

TAB.1
Total range of inclination before and after stretching with BLACKROLL®

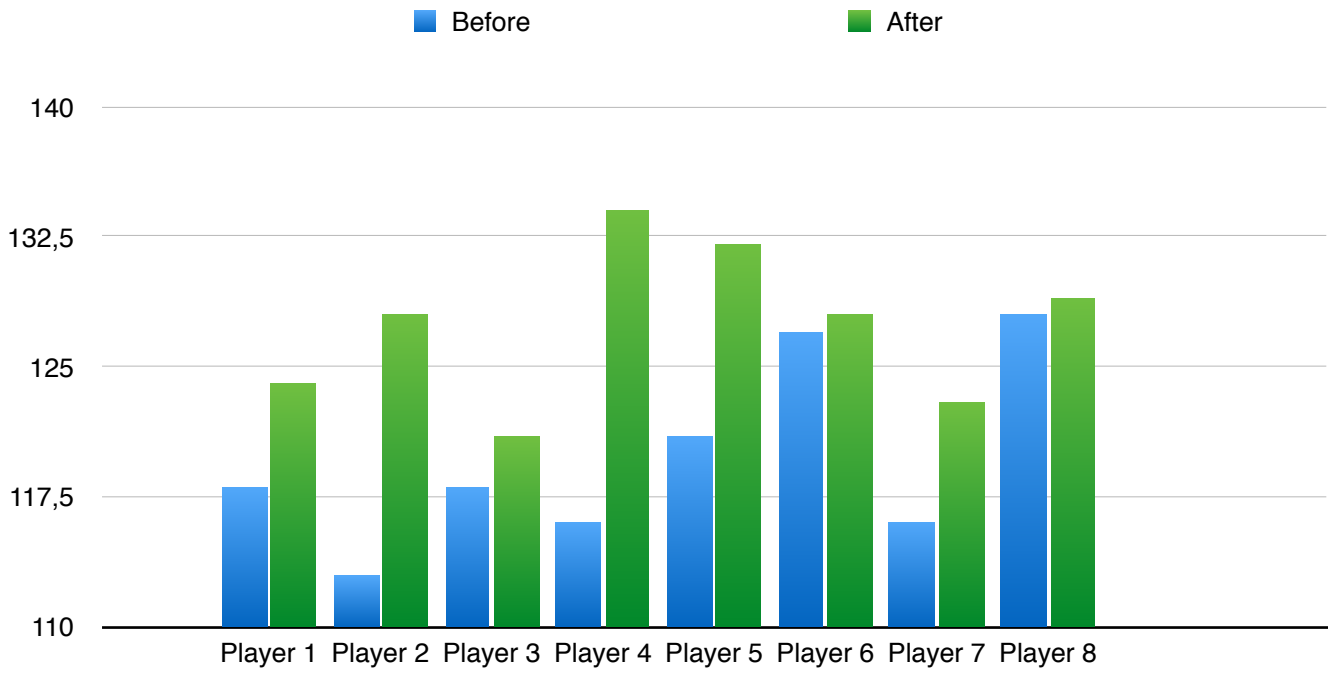


CHART 1
Total range of inclination before and after stretching with BLACKROLL®

Discussion

The range of motion into the forward bend is affected by several individual parameters, such as the ratio between the length of the trunk and legs, the movement in the pelvis, the hip mobility, shortening of hamstrings and hyper-mobility. The range of motion in the thoracic and lumbar spine in the sagittal plane decreases with age. Kapandji (1974) states that for the forward flexion of the lumbar spine the range is 60 degrees, and for the thoracic spine another 45 degrees. Therefore the overall range of motion of the thoracic and lumbar spine for forward flexion in physiological circumstances is 105 degrees. Beyond this point, during the forward bend with arms outstretched towards the floor, the movement in the pelvis activates, i.e., hip flexion takes place. This movement in the hips often compensates for the inadequate mobility of the thoracic and lumbar spine; for this reason, it is impossible to state the distance from the 3rd fingertip to the floor (FTF test) in terms of which segments (thoracic spine — lumbar spine — pelvis / hip joint) and in what ratio they contribute to the overall range of motion into the forward bend. Since the aim of our study was to establish the range of motion into the forward bend more detachedly, we decided to replace the orientational measurement of the FTF test by measuring of the spinal detector. The total range of inclination measured by SpinalMouse® includes all three flexion parts of forward bend - thoracic spine, lumbar spine and hip joint.

Conclusion

Although our pilot study set is small, the measurements before and after a 45-minute stretching programme with the BLACKROLL® point at the positive effect of this type of training to improve mobility in the thoracic, lumbar spine and the hip as well. The SpinalMouse® portable device can objectively measure the range of motion into the forward bend, and within clinical studies it should replace the non-specific FTF test.

References

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