

# The Concept of Trunk Connection can be Applied for the Training of Short Distance Sprint

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## Abstract

Authors have continued various research concerning masters' athletes, flat grounding, two axis operation, and so on. The case is a male para-athlete teenager. We applied a concept of trunk connection to him, in which the head, chest, and pelvis seem to be three circle or sphere with mutual links. The connecting points are the mastoid of the head working ball, the sternoclavicular joint of the thoracic working ball, and the upper and posterior iliac spines of the iliac in the lower abdominal working ball. The exercise drills include starting posture and sprint just after the start with the concept.

**Keywords:** Trunk Connection; Intra-Abdominal Pressure (IAP); Short Distance Sprint; Starting Posture; Flat Grounding; Two Axis Operation

## Introduction

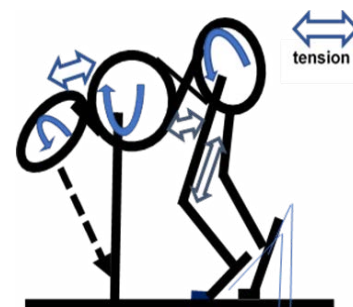
For current situation of the sports around the world, Olympic and Paralympic Games in Tokyo are in focus [1]. Authors have continued various activities concerning Japan Masters Athletic Association for years [2]. Among them, we have given seminars and workshops about how to run without any injuries for athletes. Generally, the preparation exercise for body flexibility is always necessary [3]. Specifically, the important points to give lectures include flat grounding, two axis operation, running on pushing at heel rather than kicking on sole hallucal area [4,5]. Simultaneously, we have developed several researches concerning the flexibility of thoracic and lumbar vertebrae [6,7]. In the light of rehabilitation and exercise for spinal region, we have recommended pole exercise, which has been simple and effective for various health and medical problems [8,9].

Combined both of these researches, we have come to present a project of starting practice in the short distance sprint. We have taught a young candidate for Paralympic games Tokyo 2020 for 100m dash. In this article, we describe the exercise of short distance sprint.

## Case

The case is a male para-athlete teenager. When he entered high school, 100m dash took 13.38 sec. After coaching 1.5 years, the time became 11.84 sec, and he has continued practice after that. Several important points that the author has taught were as follows: i) do not kick on the toe (sole hallucal area) [4,10]; ii) always push on the heel (whole plantar region) [4]; iii) flat grounding (sole function) [5]; iv) keep forward leaning [6]; v) two axis operation [6]; vi) relax without tension; vii) do not intend to move the arms; but just keep arms attached the trunk naturally.

In this article, an idea from the trunk connection would be introduced. We have actually applied this idea to the runner case. The concept of the trunk connection refers to the movement of the head, chest, and pelvis (lower lumbar region) in the sports movements. They are represented by three circles or spheres [11] (Figure 1). When understanding simply, three circles exist in a plane and two-dimensional. However, it is actually three-dimensional sphere or spherical surface, due to the presence of some twisting movements [12].



**Figure 1:** Consciousness of starting posture with the concept of trunk connection.

These three parts are considered to be slightly moved three dimensionally, then our body can move smoothly and naturally. The connecting points are i) the mastoid of the head working ball; ii) the sternoclavicular joint of the thoracic working ball; and iii) the upper and posterior iliac spines of the iliac in the lower abdominal working ball.

As mentioned above, the practice of starting was actually performed based on the concept of the trunk connection. When starting, the subject would be focused on the three spheres in the consciousness (Figure 1).

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The key points of starting posture are i) lowering the gaze, ii) conscious of rotating the head slightly forward, and iii) creating and feeling the presence of tension in the neck. Consequently, the abdomen is stretched, the intra-abdominal pressure (IAP) is increased, and the tension of the hamstrings is felt, and then the consciousness of the hip joint becomes clear [13].

For the important point, the heel pushes the start plate out and jumps out in the first step of the start [4,5]. After that, each step with sprint can bring pushing of the heel and grounding flat, and then the forward leaning posture can be maintained [6]. However, if the first step becomes a kicking with a toe, the upper body may be raised for upright posture. After that, kicking situation would also continue even after the second step with upright posture.

Jumping out of the position (Figure 1) is considered to be the same image as one of the weightlifting exercises [14]. It is the operation of the second pull of the quick lift operation which is performed for the purpose of training instantaneous power.

Furthermore, the subject practiced the short distance sprint after the start. The purpose of the drill was to keep the posture lower by utilizing the concept of trunk connection (Figure 2).



**Figure 2:** Consciousness of sprint just after the start with the concept of trunk connection.

This practice method seemed to be effective for the following reasons:

- Rotating the head forward increases the awareness of the body axis (the centre of the gravity), then it is easy to maintain a forward leaning posture [6].
- Rotating the thorax backward increases the tension of the abdomen [7]. Then, the abdominal muscles and iliopsoas are stimulated and work to keep the pelvis in an upright position. Further lowering the diaphragm while expiration will increase intra-abdominal pressure (IAP) [13].
- By accumulating all of the above operations, the unity of the entire trunk is further strengthened with muscle contraction. Overall, these operations develop in the direction for trunk extension.
- When this lower posture is maintained, the leg lifting operation using the iliopsoas muscle can be performed easily anatomically and kinematically [10].
- At the same time, the leg can be easily extended using hamstrings by maintaining the posture [5,6].
- By the operation of the sagittal plane, both the iliopsoas and the hamstring are stimulated. Both muscles have the function of antagonism. When this function may be strengthened, bilateral legs can open wide back and forth, leading to increasing running stride [6,15].

Regarding the six stages above, one of the references would be the movement of reggae dance [16]. As the head rotates forward and the chest rotates backwards, the chest becomes stretching and the pelvis rotate slightly forward. Consequently, pelvis tends to be upright position, which is advantageous for running in athletics [16].

## Conclusion

In summary, the authors have taught short distance sprint to a para-athlete. During them, the trunk connection was studied in the crouching start posture and sprint posture just after the start. The head, chest, and pelvis were considered three spheres, and their mutual effects were investigated. This article would be expected to serve as a reference for the future research.

## Conflict of Interest

The authors declare no conflict of interest.

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