

Hip rotation.

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Hip rotation (Koshi 腰 Kaiten 回 転) is the most significant of the bodies applied mechanical principles in sport. Coaches are constantly referring to it and placing great emphasis on the correct use of the hips; especially when the expectation is one of delivering a powerful & decisive technique. This importance is justified no matter what the sport is, as can be seen in Fig 1, 2, 3, 4, 5. Diligent Karate coaches are often heard offering this advice, "Use your hips to punch, block and kick".



Fig 1

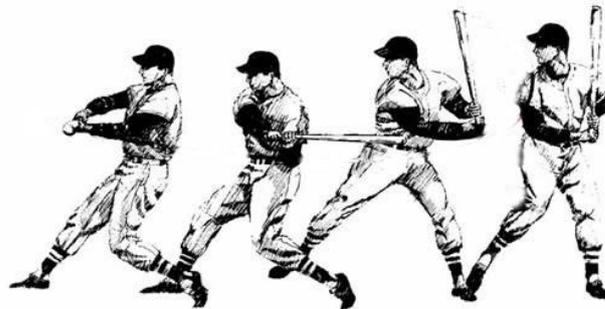


Fig 2



Fig 3



Fig 4

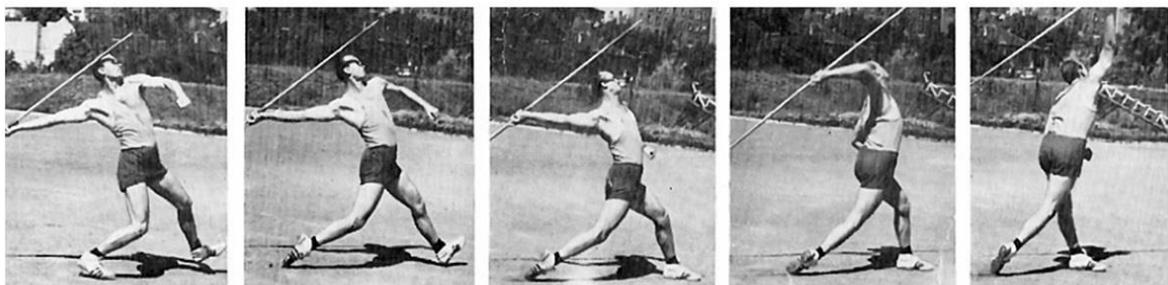


Fig 5

Because the hips really are that important to the success of a technique, then students and coaches should study the structures of the body that make up the pelvis and the hips. Later the article will discuss how to deploy them effectively.



Fig 6

Fig 7

The hip joint is a ball and socket synovial joint. Its contact surfaces are the head of the femur (the ball) and the acetabulum of the pelvis (the socket). It joins the lower limbs to the pelvic girdle. The hip joint is designed to be a weight bearing joint. The hips are second only to the shoulder joint for the large range of available movement; it does however, sacrifice some of that range to increase upon its stability. The function of the hip joint are to be weight bearing, as an anchor point for the strong muscles of the hip, to shock absorb the forces that those strong muscles generate, to link the lower limbs to the upper body via the pelvis, and to facilitate the articulation of the lower limbs.

The components of the hip are bones, muscles, ligaments, cartilage, synovial lining, bursars, nerves, and blood vessels.

As stated earlier, the hips are capable of a wide and varied range of movements as can be seen in Fig 8, they are as follows : **Internal Medial rotation** as used to achieve the stance of "sanchin dachi" : Muscles used, Gluteus medius and minimus, semi tendonous and semi membranous. **External Lateral rotation** as used to achieve the stance of "shiko dachi": Muscles used, Biceps femoris, gluteus maximus, and the deep gluteals (piriformis, gemelli etc). **Flexion** as used during the knee lift phase of maegeri: Muscles used, Iliosoas, rectus femoris, sartorius. **Extension** as used during the straightening of the leg phase of ushirogeri: Muscles used, Gluteus maximus, semi membranous, semi tendinosus and biceps femoris. **Abduction** as used in yokogeri keagi: Muscles that are used are Gluteus medius, gluteus minimus and the deep gluteals (piriformis, gemelli etc). **Adduction** as used in ashi barai: Muscles used, Adductors longus, brevis and magnus, pectineus and gracillis.



Fig 8

While in general, karate performance uses all of the above directions of hip movement, this article will focus upon **External Lateral rotation** and **Internal Medial rotation**, the result of those two movements can be seen in Fig 9 & 10 where the performer is opening and closing their hips just as one would do in the performance of ones blocking and punching techniques.

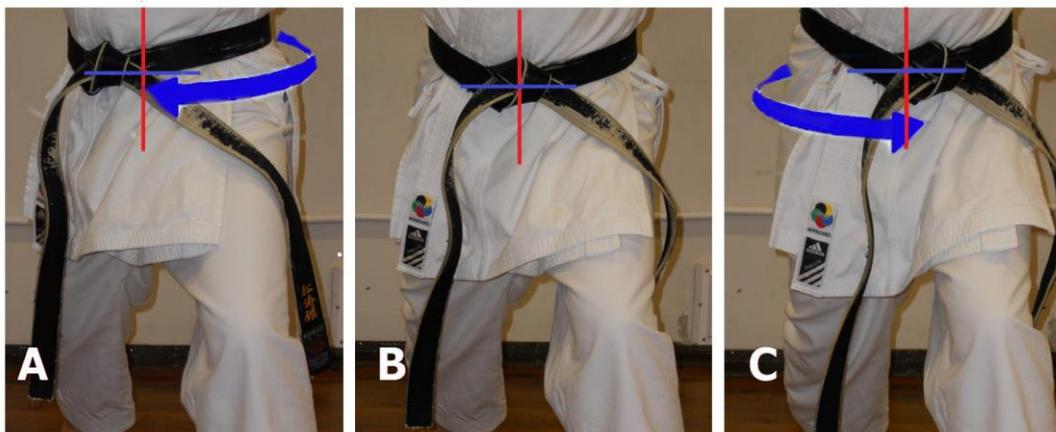


Fig 9

Hip Rotation koshi kaiten Fig 9 (a) Hanmi, is the half facing, open position, opened to a position of + 45 degrees, achieved by using gyaku kaiten the reverse rotation. (b) Shomen is the front facing, closed position, the central, neutral position of zero degrees. To return to shomen from hanmi requires the use of jun kaiten regular rotation. (c) Gyaku Hanmi, is the reverse half facing position, it's another open position, but this time it's opened in the opposite direction to hanmi, it's opened to approximately - 45 degrees and to achieve this position, gyaku kaiten the reverse rotation is used again but this time it is a reverse rotation in the opposite direction from the zero degree position to that of hanmi. The blue horizontal line of the cross depicted in Fig 9 (a) (b) (c) represents the horizon line, which will be the horizontal reference point for the hips. Ensure that during your smooth execution of the rotation of the hips that they stay parallel to the blue horizon line at all times. Observe in Fig 9 (a) (b) (c) how despite the hips going through rotation that the knot of the belt remains on the same plane at all times. The red vertical line in the cross

depicted in Fig 9 (a) (b) (c) is an indicator; it's marking the fixed central, neutral position, and is therefore, the zero degrees position, as can be seen by how the knot of the belt in (b) is in line with both the red vertical line and the blue horizontal line. The blue circular arrow depicted in Fig 9 (a) (c) is an indicator of the direction of rotation that is required to achieve each of the respective positions.

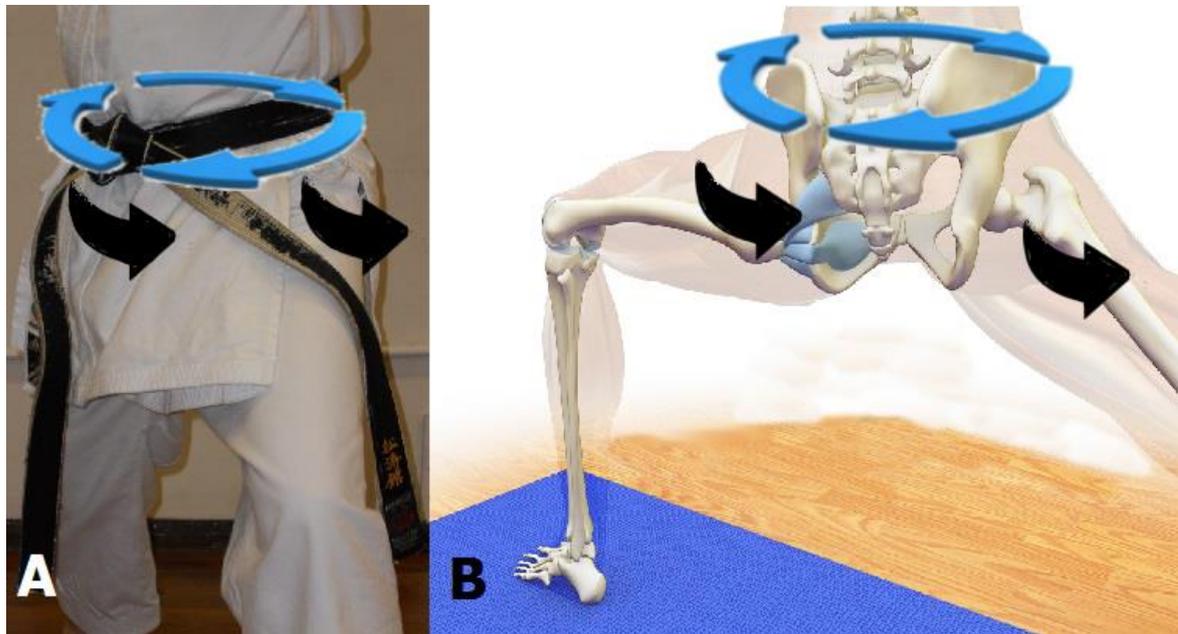


Fig 10

Hip Rotation koshi kaiten in Fig 10 (a) (b) the rotation displayed results in the body being in the Hanmi, half facing position, where the hips are opened to a position of +45 degrees, and in this example it is displayed with the left leg placed forward. Fig 10 (a) displays an anterior view, while (b) displays a posterior skeletal view. The blue circular arrows in both (a) and (b) indicates the direction of rotation that is required to achieve the hanmi, half facing position. As the legs of the stance in this example are both static during the hip rotation, then the black arrows in both (a) and (b) indicate the direction of rotation that is experienced at the head of the femur (the ball) and the acetabulum of the pelvis (the socket). It can be seen in both (a) and (b) that the left hip is experiencing External or Lateral hip rotation, while the right hip is experiencing Internal or Medial hip rotation. Now let's look at the rotators, the muscles and ligaments that are involved in the performance of these movements.

External or Lateral Hip Rotators (Left Hip)

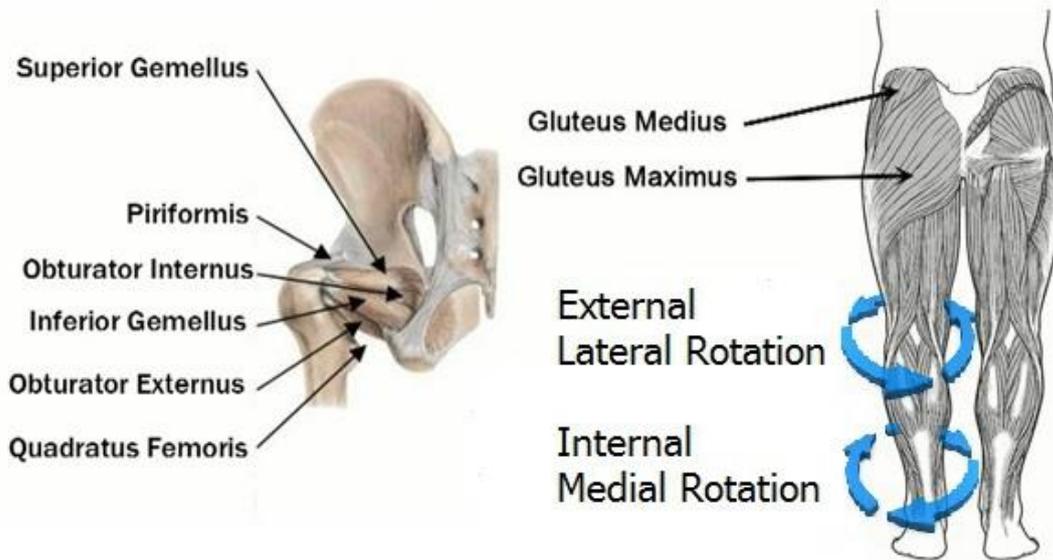


Fig 11 External or Lateral hip rotators.

Internal Hip Rotators

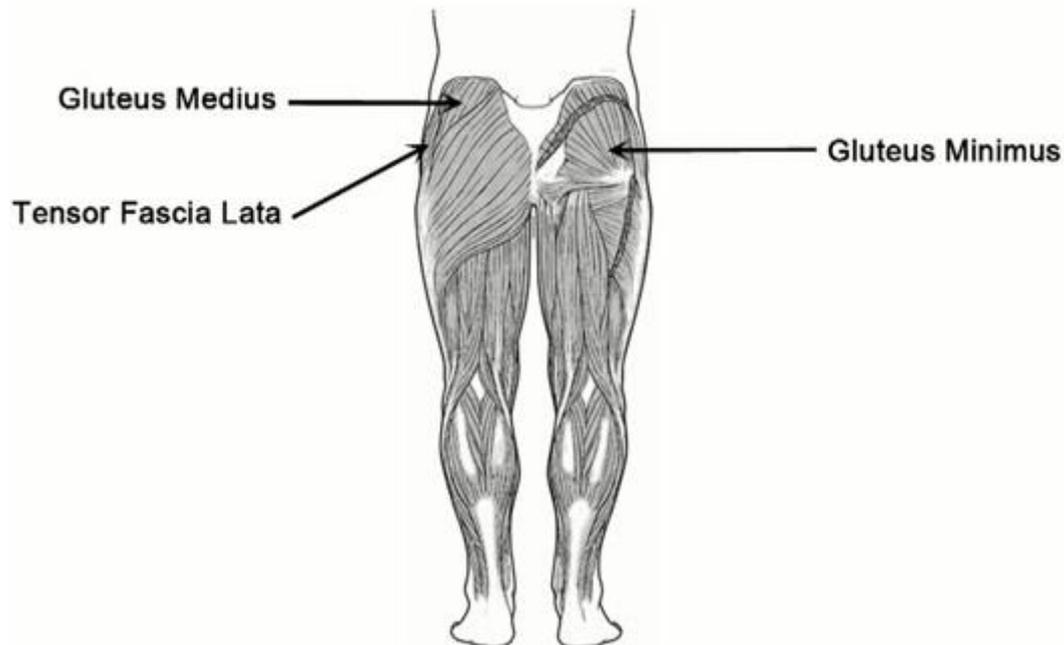


Fig 12 Internal hip rotators

Lateral Rotators of the Spine

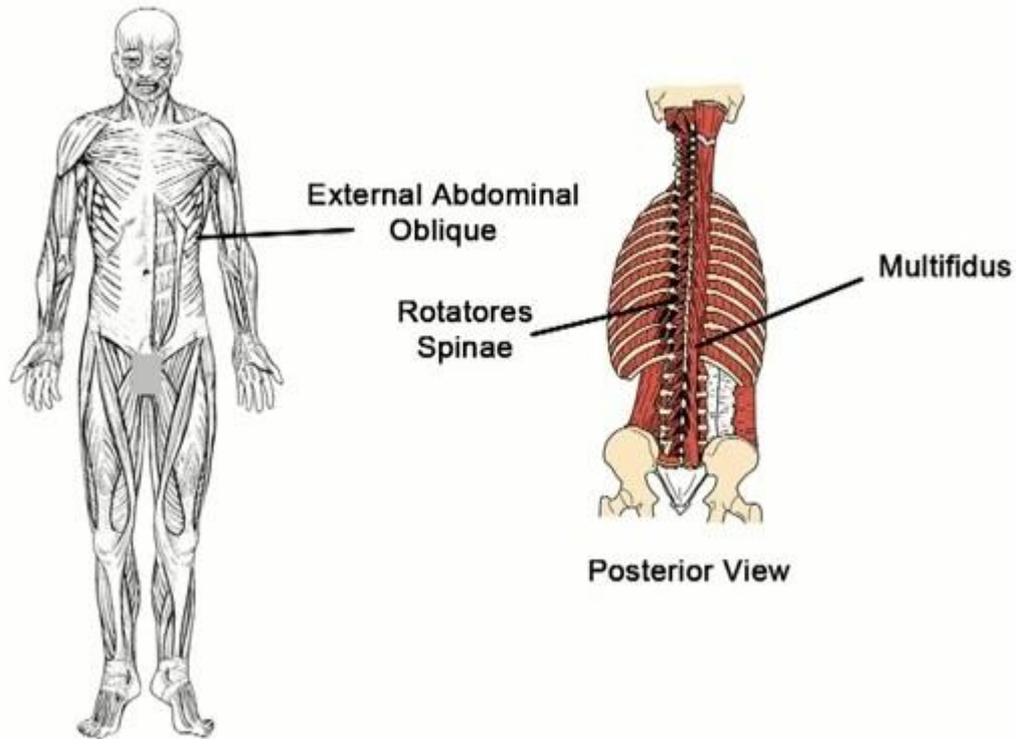


Fig 13 External or Lateral rotators of the spine.



Fig 14 Posterior view of the muscles of the right buttock and leg

As the hips are at approximately the centre of the human body they are utilised for balance, movement, power, and the Japanese believe that deep inside the pelvic

girdle lies the location of one's spirit, the area is referred to as "The Hara or Tanden". The hips should be applied smoothly but with vigour and lots of spirit, just like Lingford Christie's theory of the B in the Bang. Correct hip rotation kick-starts the chain reaction of movement that is on the striking side of the body and begins with the hips, spine & chest, shoulder, upper arm, elbow and hand or fist in harmonious synchronicity. It works on the principle of whereby the relatively small distance of movement travelled by the hips from the open + 45 degrees position of hanmi, to the closed zero degree position of shomen and visa versa is multiplied and magnified by the time the mechanical rotation reaches the target via the fist. This is similar to the action of beads that strike the skins of the Dendendaiko or the Japanese rotational drum in Fig 15. The chain reaction theory albeit in reverse in its basic form is also applied to the hikite side of the body simultaneously.



Fig 15 Dendendaiko
Japanese rotational drum.

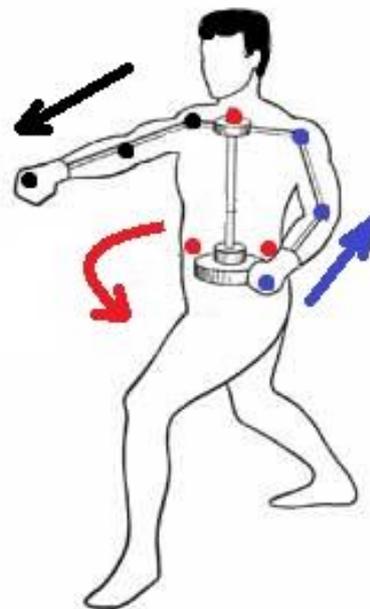
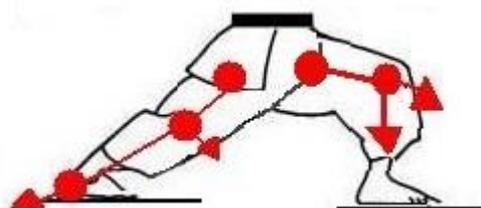


Fig 16

To maximise and augment the mechanical principles outlined above, the psychological and bio-mechanical importance of a firm and fast withdrawal of hikite (withdrawing hand) is crucial; no matter the distance Hikite may have to travel, because the faster the withdrawal of hikite is, then the faster the drive of the technique will be. Hikite in Fig 16 is the left arm and is indicated by the three blue spots placed on key areas; the direction of travel is indicated by the blue arrow. Hikite not only assists in speeding up the technique but it also aids with counter-balance and the strengthening of the sometimes misnamed "non punching side of the body", as this term may give the impression that the hikite side of the body is a passive observer in the hip rotation process. The feeling of a good hikite is one of a

vigorous pulling action of the withdrawing hand, as if one were trying to pull enthusiastically on the start chord of a petrol driven outboard motor. Think of hikite not as a passive movement, but as if you are performing a chudan (mid-level) ushiro empi uchi (backward elbow strike) to an opponent that is stood directly to the rear. And therefore, you need to drive the technique of hikite strongly to its destination. For the Hikite side of the body the chain reaction theory also applies but it is in reverse to that of the striking side of the body, it starts with visual imaging technique in the preparation stage of the basic technique of the withdrawing hand, elbow, upper arm, chest & shoulder, spine, and hips, simultaneously engaging and seamlessly thrusting backwards.



Another factor to consider is the contribution made to the overall success of the delivered technique by the use of applying downwards driving forces through the legs, specifically when it is co-ordinated with the techniques impact with its desired target. This driving downwards action anchors the base of the stance, and it augments the power of hip rotation and therefore, it does likewise for the power of the delivered technique when all of the other factors are performed correctly and in the right sequence.

Areas of Consideration

Don't allow the upper body to lean from the perpendicular during hip rotation.

Don't turn the shoulders independently from the hips during hip rotation.

Don't allow the back foot to lift, as this indicates an over rotation of the hips, which will affect the stability of the stance.

Don't allow the hips to come out of the horizontal plane during hip rotation.

References

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