

Title: Mechanism of generating power/ Flexibility of hip joints and its useful applications

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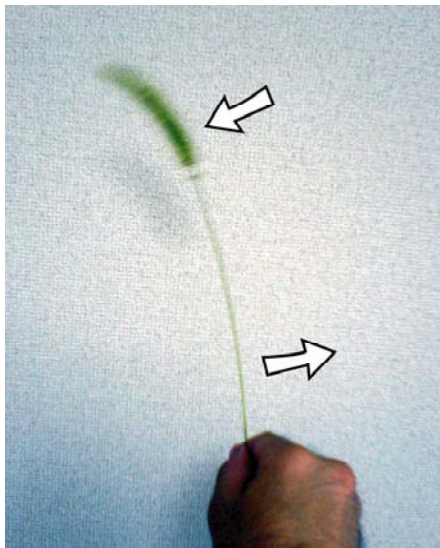
< Abstract >

It is described about important role of flexibility of joints when power is generated for pitching or hitting showing mechanism how power is generated. How you can throw hard or how you can hit hard is all depends on how much flexible your hip joints are. It is also proposed a method to keep/ make the joints flexible and its potential possibilities with sports and health.

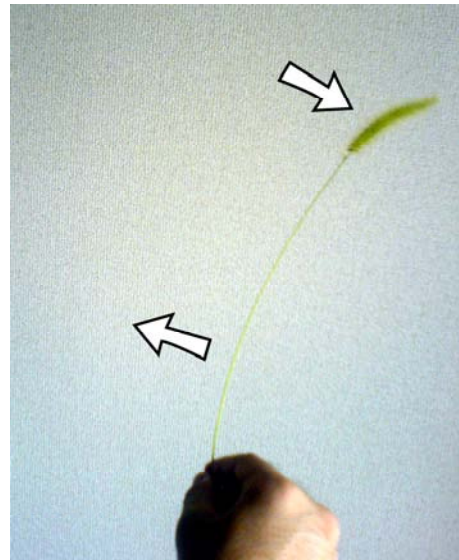
1. Mechanism of power

At ball game, difference between talented people and not talented people look rather clear than other sports. For example at baseball talented athlete can pitch really a fastball over 150km/h but for other people it is just a dream to do the same although how much they make efforts. It is believed only a matter of talent given by the God. But now question arise, what is talent? What is the crucial point, which divide people who have and does not have the talent?

Talent is how much you can generate power in your body for hitting or slowing and it looks the power is all related to flexibility of your hip joints at movement rather than weight of muscles or heights. Let me explain about this.



Picture 1



Picture 2

I was bending bristle grass in these pictures to show how power is accumulated in the grass. As you can see, to accumulate power by bending, 2 different vectors should be used in opposite directions.

Actually we are using our body in the same way when we sport. As for pitching or slowing, you should agree that you are generating power by using upper-body (above hip joints) and lower-body (below hip joints) in different timing to get 2 different vectors in opposite directions.

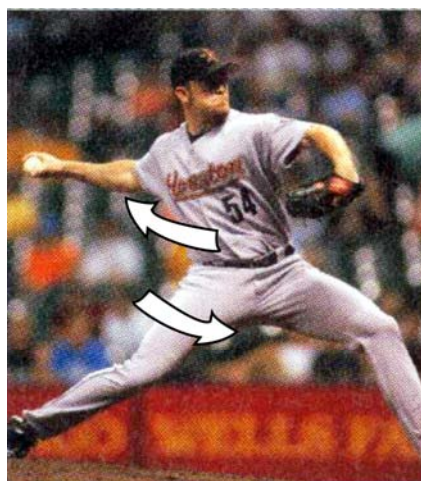
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Below is a picture of a tennis player. She is using upper-body and lower-body in different timing to generate opposite vectors to accumulate power for hitting. She twisted body and moved lower body at first. At that time in the lower body, power was naturally twisting back by stepping forward inside to meet/hit power from upper-body coming up. This combination of vectors helps to accumulate/generates power(another vector) in her body for hitting a ball.

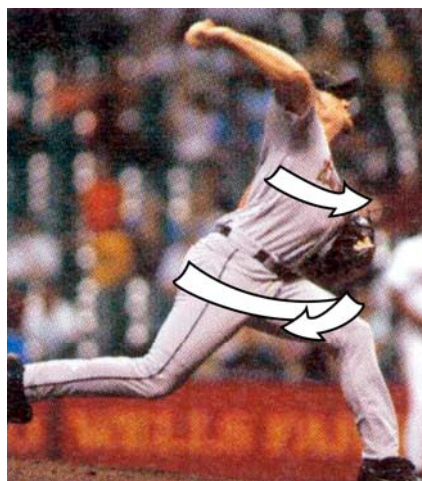


Picture 3

Next is a pitching form of Brad Lidge. He slows really fast.



Picture 4



Picture 5

He is also using upper-body and lower-body in different timing.. Twisting body, stepping inside to generate twist-back in lower-body that hit/meet the power from upper-body at right timing to generate another power (vector) for throwing. Since the both twisting, at take-back and step-forward, happen on hip joints, the more flexibility of the joints, the more you can generate power accumulation in your body.

Next is a batting form of Ken Griffey.



Picture 6

You can see that he is producing power by using upper-body and lower-body in different way. Please have a look at his toe in the front leg. He is stepping quite inside that is because of making stronger twist-back at lower-body. Only difference to the tennis receive on Picture 3 is angle of wrist. What is amazing is that he can twist upper-body until the end of finish hitting inside. That shows how his hip joints are flexible. It is no surprise that he is such a great player.

At the 2002 Kyoto conference of ISEA (International Sports Engineering Association), I presented this movement as below.

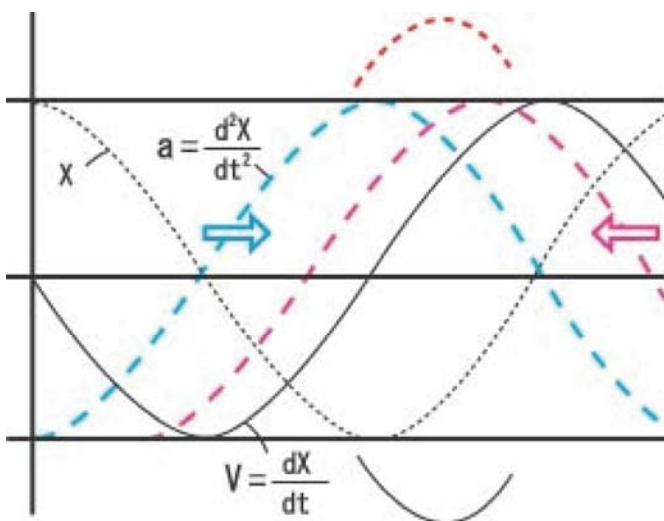


Illustration 1

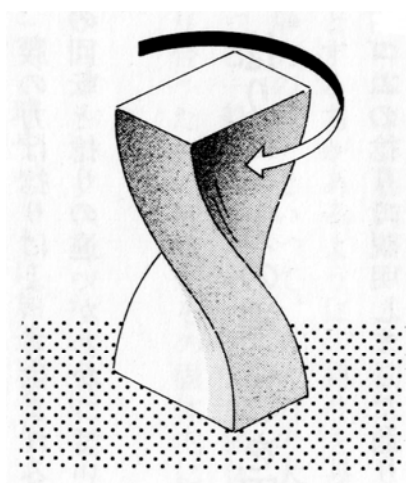


Illustration 2

This shows that 2 power waves, one is wave of upper-body and other is wave of lower-body, are meeting, interfering to generate bigger wave. The reason why I showed power by wave was that power from twisting should have as same property as a spring that can be described by wave.

By the way, Mr. Yutaka Murakami mentioned that Twisting is power source, not rotation, in his book titled Kagakusuru Yakyu but did not describe why. If we assume that the model "twisting combination generate power (vector) and that is a main power source for throwing, hitting (probably for running too), we can answer to a lot of why that is observed in the field. In other words, inductively I can assume that the model is adequate.

a) Why timing is important than muscle power.

Power for hitting/ pitching is supposed to be generated like interfering of 2 waves. That's why timing is important for better interference to generate power. If muscle was main power source of hitting/throwing, power would be observed more steady.

b) Why fastball from side-hand pitch is slower than overhand.

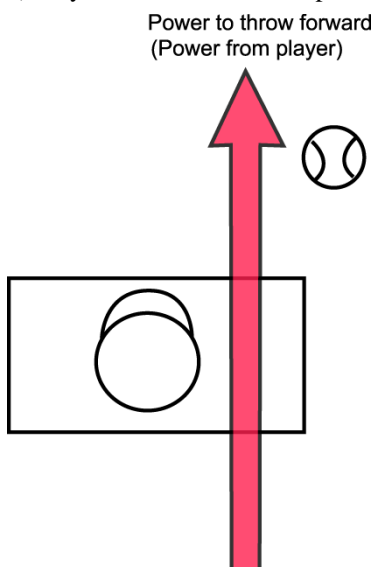


Illustration 3

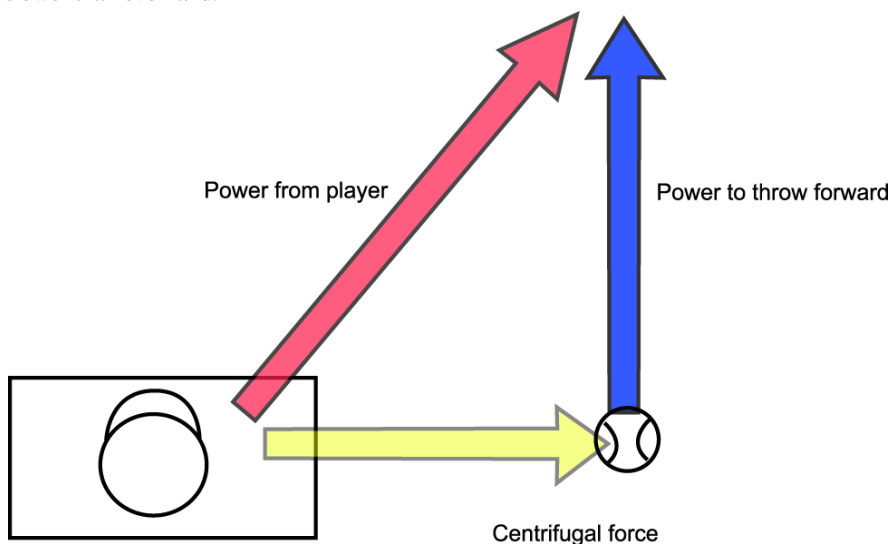


Illustration 4

By throwing side-hand, rotational movement is introduced that generate centrifugal force that consume power (Illustration 4) from player. Overhand pitch does not introduce rotation and can full use of power. (Illustration 3)

c) Why you have to swing compact(inside-out). (Is bat speed critical issue for hitting?)

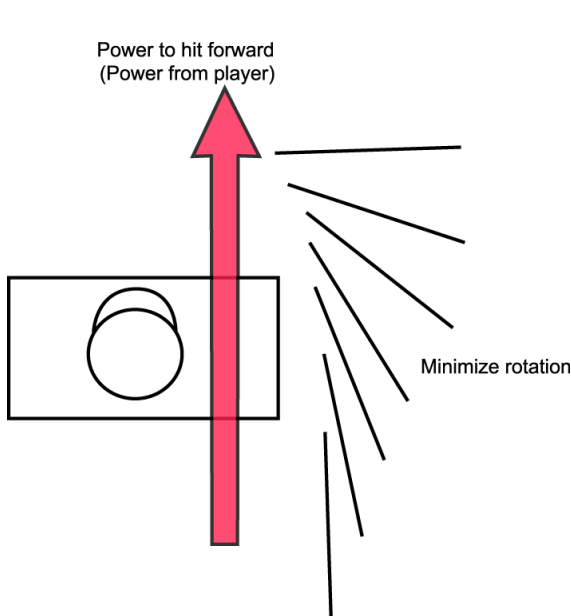


Illustration 5

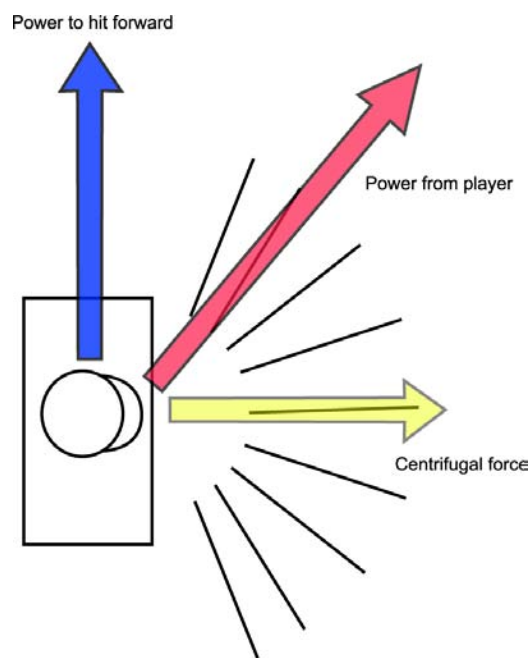


Illustration 6

To minimize rotation, you have to swing compact. (Illustration 5) If you increase bat speed, it tends to introduce rotational movement that generate centrifugal force and reduce power to hit forward. (Illustration 6) Faster the bat speed, the kinetic energy is bigger though centrifugal force will be also bigger that reduce power. So that bat speed (at impact) won't be important. Additionally if you swing with minimum rotation (Illustration 5), maximum bat speed will be in front of you, not at the impact zone because there is time gap between power (acceleration) and speed. (Illustration 1) This is reason why you make your follow-through bigger. (This will be the same with other sports such as playing tennis or golfing)

2. Flexibility of hip joints

I am using the words “flexibility of joints” but then let’s think about it. What the “flexibility of joints” is.



Picture 7



Picture 8

Above is pictures of me doing Matawari exercise “sprit your legs”. 13 years ago. I tried to see if this exercise helps me to improve my sports ability such as slowing and hitting. This exercise did help to improve my hitting a fastball at batting cage to some extent but performance was unstable. Also for better performance I had to use a bat that helps twisting my body. Biggest problem was it is too hard to do for everybody.

One day, I had a question. “how can you make your joints flexible? The joints are like round balls are in cups. They should be flexible enough.” He was right. Below is a picture of hip joint.

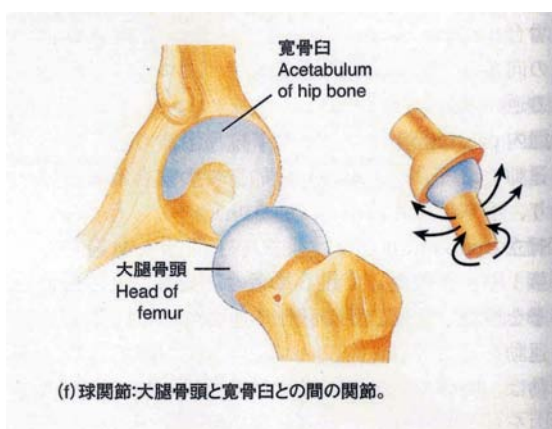


Illustration 7

Hip joints should be flexible enough by itself. I realized that it was not hip joints that should be flexible. But there should be something, which hinders joints flexibility and you should remove that.

I assumed that the hinderance is shape/ size of pelvis and muscles around the pelvis related to hip joints. Everybody at hip joint. I started trying another exercise that would be more simple and pinpoint. And I propose below exercise.

- 1) Stand putting your toes inside that will put your hips backward and strap your above knees to fix the knee direction. (Picture 9 and 10)
- 2) Pulling your legs side by side, stretch internal muscles such as sartorius muscle, iliopsoas muscle and the muscles inside of thighs. (Picture 11)

By pulling your legs side by side, you can make muscles outside of thighs anchor that enable to stretch the internal muscles.



Picture 9



Picture 10



Picture 11

The purpose of this exercise is stretch below illustration 8 (sartorius muscle, iliopsoas muscle etc) and also for adjustment of pelvis alignment at around sacrum bone. By stretching these muscles, flexibility of my joints were improved. I believe that the obstacle is stiffed muscle of these and posture/size of pelvis with the muscles.

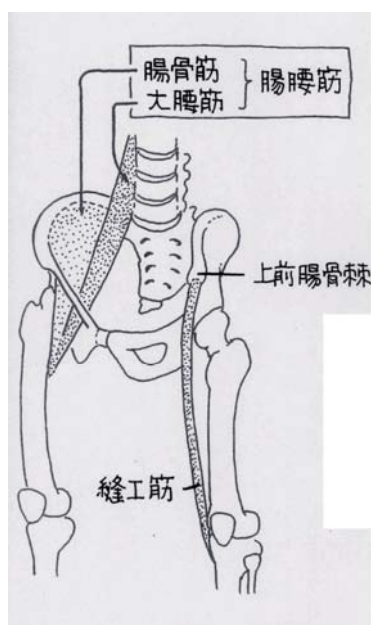


Illustration 8

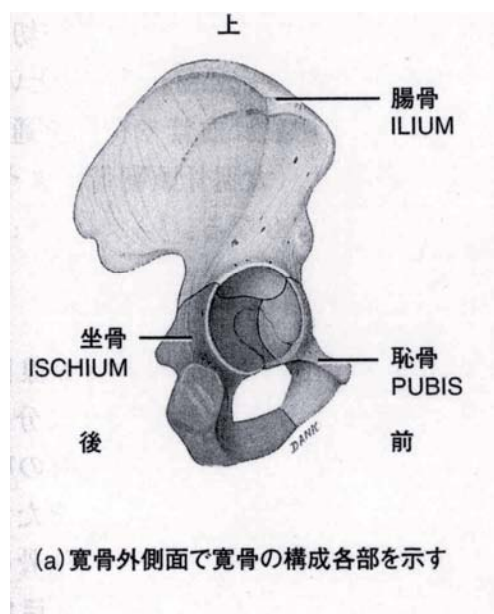


Illustration 9

I confirmed that the exercise helped a lot to improve “flexibility of hip joints” but unfortunately could not improve my throwing ability so far. (Hitting was stable.) I conclude ability of pitting hard will be fixed at young before shape of pelvis is fixed.

Illustration 9 is a picture of pelvis and it is consisted by 3 bones. The 3 bones are connected to become a big bone by 23 years old. To improve flexibility of joints, it is optimal to instruct the exercise to young people for better alignment of bones and muscles before their 3 bones are fixed. That will produce a lot more talented athletes in the future.

3. Practical applications

As practical applications, there is big potential for the exercise.

1) Produce number of talented people

By introducing the exercise to young generations, we will be able to produce a lot of talented athletes in many sports. As for baseball, right now people are “hunting” in search of talented athlete in many countries but now we will be able to “farm” at local places.

2) Maintaining high performance for a long time

Once flexibility of joints got inflexible by some reasons, athlete will plunge into slump. Introducing this exercise, athlete will be able to maintain high performance all the time. Especially it will be effective for athlete whose performance is down due to age. Because once his performance was great, it means size and posture of pelvis is in good shape and only it is matter of muscles that will be easily stretched and recovered.

This is also good for collecting data. Introducing the exercise to old athletes, we will be able to confirm if the exercise is effective or not.

3) Rehabilitation

This exercise might be effective for rehabilitation of athlete too. Especially may good for knee injury.

If flexibility of joint is getting low, twisting power will go to knees that may lead to knee injury.

Generally athlete, who hurt knees, just concentrate on curing their knees however unless recovery of flexibility of joints, they will hurt their knees again. I guess Mickey Mantle suffered this. Matsui would be also. To prevent repeated injuries, this exercise will be a help.

4) Short sightedness

Last but not least, I think bad alignment of pelvis (and muscles around it) affects spine and neck and ultimately affects size of eyeballs that is the cause short-sightedness.

It seems that people who are suffering short-sightedness have common symptoms. They have strains at spine and neck and generally have rounded shoulder. I think that the strain is coming from bad posture of pelvis (and muscles around it). And the neck strain/bad alignment is the direct cause of changing size of eye-balls. Physically stretching eye-balls with Optic nerve, Fascial sheath etc that change focus.

This assumption is not contradictory that generally short-sightedness happen only when you grow. Also it explain why particular country has many number of short-sighted people. It depends on culture, tradition in other words circumstances where people grow.

This is another study on going but if you have a chance to access/method to compare people in the heads between short-sighted and not short-sighted by using CT scan or by anatomy, you will be able to confirm this rather easily.

By introducing this exercise we might be able to reduce number of people who suffer short sightedness in the future.

Reference

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