The Centre of Gravity and its Relationship to the Application of Sports Massage.

Archimedes of Syracuse, a great scientist and mathematician is thought to have discovered the principle of the centre of gravity. He stated that "Two magnitudes whether commensurable [prop. 6] or incommensurable [prop 7], balance at distances reciprocally proportional to the magnitudes.[1]" Every object has a centre of gravity, humans and animals included, it is located at the point where an object can be balanced perfectly[2]. This may not be the central point but the centre of the mass. If an object changes shape, like a person walking or bending, the centre of gravity will move[figure 1]. When performing sports massage the body is constantly moving, meaning the centre of gravity is constantly moving, leaving the therapist unbalanced or unstable making it harder to massage. It is necessary to then alter the base of support so that the effects of the changing centre of gravity are counter balanced.

The centre of gravity in the human body when stood in the anatomical position can be found approximately in the middle of the sacrum[3][figure 1]. In an inanimate object the centre of gravity can vary in position but for example in an evenly weighted cube it would be found at the central point, this will alter if the cube is unevenly weighted. The centre of gravity is defined as "that point in a body or system around which it's mass or weight is evenly distributed or balanced and through which the force of gravity acts" [4].

In the human body that is stood in anatomical position the line of gravity runs like a plumb line from head to toe passing through the middle of the body and through the centre of gravity to the base of support[3]. In an inanimate object the line of gravity is defined as "an imaginary line that extends from the centre of gravity to the base of support."[5]

The base of support is the area that makes contact with the ground. A person stood in the anatomical position would have a small area of support, this would be the area where the feet touch the ground and the area in between. The base of support is defined as "the area underneath and between both feet"[6].

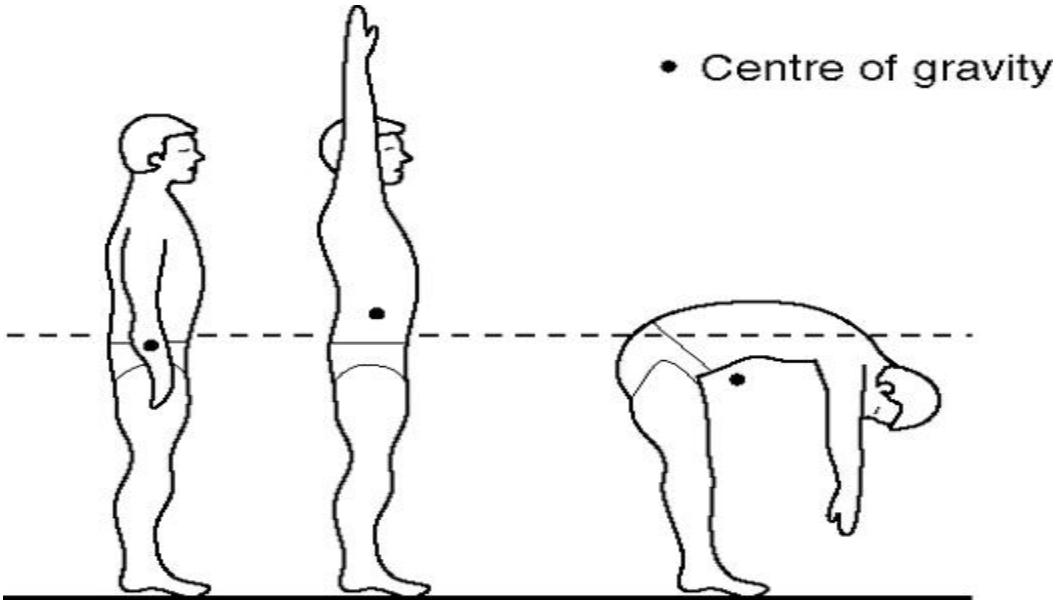

Figure 1 centre of gravity[7]

When a person moves in massage the centre of gravity and line of gravity will move, this means the base of support has to be altered to compensate. If the body is bent too far forward the line of gravity and centre of gravity can be moved outside of the body[figure 1 & 2] this can make you very unstable unless the base of support is altered so that it is under the centre of gravity and therefore the line of gravity dissects with the base of support to bring back stability.

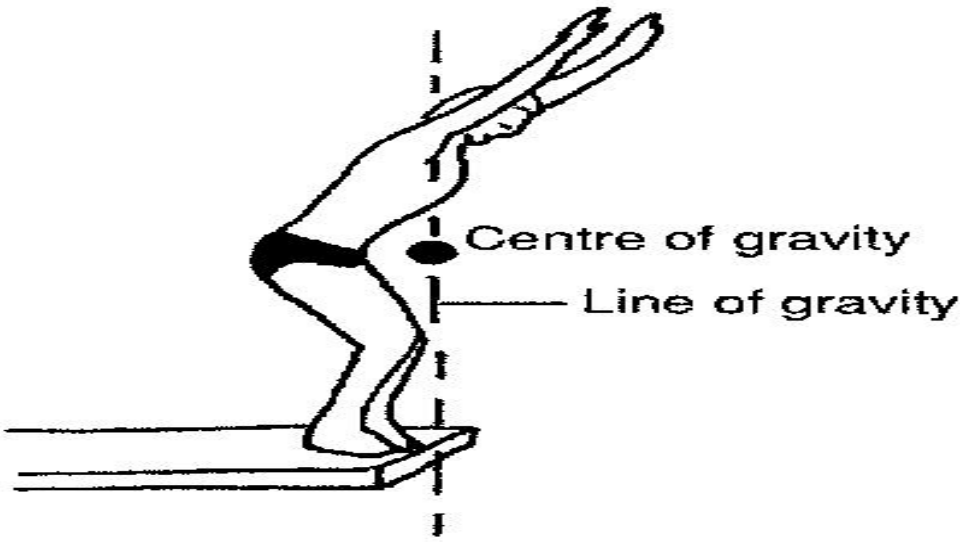

Figure 2 centre of gravity outside the body[8]

The two main stances used in sports massage are the lunge stance and parallel stance, which provide the practitioner with the largest base of support.

Experimenting with these two stances and feet together firstly without a plinth and secondly with a plinth, working through the various hand skills it becomes very apparent, very quickly the advantages and disadvantages of the different stances and how the moves affect the line of gravity, centre of gravity and inevitably, balance.

Standing with feet together and no plinth gives very little range of movement, quickly leading to loss of balance and negative posture. When using the plinth with this stance the base of support becomes much larger as the plinth becomes part of that base, however this still promotes poor posture and a limited range of movement, becoming uncomfortable quickly and limiting effectiveness due to the poor range of movement available.

The lunge stance gives the best stability, both away from the plinth and even more so with the plinth. It is an effective stance for long sweeping moves like many of the effleurage hand skills, for example forearm glide, flat hand, V or bilateral but not opposing glide or rake where the body weight need to be applied downwards. It is possible to keep a much better posture and a better flow through the moves as the stance is stable. This stance works well because the centre and line of gravity although outside the body and constantly moving are constantly over the base of support.

Parallel stance although stable, without the benefit of the plinth is not as stable as the lunge stance. When the plinth becomes part of the base of support the effectiveness of the stance is increased. The parallel stance is good for moves where pressure is applied downwards such as compressions or opposing glide as the therapist is leaning into the base of support and therefore the line and centre of gravity are once again over the base of support. This stance allows the therapist to get lower and closer to the client which is needed when performing hand skills such as the rake.

It is important as a sport massage therapist to understand the centre of gravity, line of gravity and base of support in relation to massage, to allow the therapist to provide a safe treatment for both the practitioner and client, and prolonging the ability to practice whilst minimizing injuries. By using the correct stance (base of support) better balance is obtained as the line and centre of

gravity stay within that base. A solid stance enables the practitioner to apply more pressure and not slip when massaging whilst ensuring too much or uneven pressure is avoided. Better posture can be held when not trying to fight the centre of gravity.

List of references

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