Exercise Technique: The Pallof Press

ABSTRACT

The use of core training is very common in the field of strength and conditioning. The Pallof press is one such exercise which is considered a transverse plane or trunk rotation exercise. The use of this trunk-based exercise is implemented in strength and conditioning programs to aid in core stability. Exercise technique and the benefits of this exercise has been described in this article. The key coaching points for each position along with a progression and regression continuum for the Pallof press, has also been outlined. This continuum along with the suggested programming can be utilized by practitioners to aid in lumbopelvic stability.

INTRODUCTION

The use of trunk training to develop the lumbopelvic-hip-complex or “core” has been identified as a very important component in general fitness, rehabilitation, and strength and conditioning (S&C) settings (3,6,11,20,23,30). Throughout the literature, core stability training has been cited as a potential method to help improve performance in both sporting activities and daily living among individuals (10,12,15,20,31,40,41). The term “core” refers to the musculature of the trunk region which has previously been divided into three categories: 1) global core stabilizers (e.g., erector spinae and rectus abdominus), 2) local core stabilizers (e.g., multifidus, transverse abdominus, and interspinalis), and 3) upper and lower extremity core-limb transfer muscles (e.g., latissimus dorsi, psoas, and gluteals) (23,39). The musculature in the lumbopelvic region has been noted to be very important in linking the upper and lower extremities (16,23) with stability in this region being described as the ability to control both movement and position (11).

From a sporting context, “core stability” has been defined as “the ability to control the position and motion of the trunk over the pelvis to allow optimum production, transfer, and control of force and motion to the terminal segment in integrated athletic activities” (15,16). The importance of this lumbopelvic stability, especially in athletic events, is highlighted in the transfer of force to the extremities, which can lead to greater limb strength and limb speed (18,23,37). Along with linking the upper and lower extremities, core musculature is essential for the prevention of buckling of the vertebrae under heavy loads, and the protection of vital organs during contact sports (18,23,37). Strengthening of this trunk area, which has been linked to aiding in lumbopelvic-hip stiffness (by reducing undesired motion), is also beneficial in activities such as running and jumping (15, 37). Therefore, enhancing the strength of the core is suggested to indirectly aid in sporting performance (37), although it should be acknowledged that a few empirical studies have debated this line of thinking (24,29,33).

It has also been suggested that the use of core training to enhance spinal stability can help prevent injuries of the lumbar spine and lower extremities (12,14,15,20). This may be of benefit to both athletes and general populations alike, as it has been stated that approximately up to 70-85% of all people in society experience lower back pain (LBP), with it being the leading cause of limited exercise participation among people under the age of 45 (1,22,27,36). McGill (20) outlined that a lack of lumbar stability may lead to micro-movements, which can lead to tissue degeneration and pain.

This theory is linked back to research carried out in the 1970s, which outlined that back injuries could be caused by joint degeneration over a period of time from repetitive microtrauma (3). This is further supported by Hides et al. (13), who demonstrated that the use of drawing in (a lumbar stabilizing exercise) from various positions caused less re-occurring LBP among patients. The rationale of using this exercise was to restore the stabilizing function of muscles such as the transverse abdominus and multifidus, as dysfunction of these muscles were found to relate to re-occurring LBP (13,28,34). It was concluded that the use of localized isometric based exercises around the lumbar region and having strong postural musculature helps prevent excessive motion; thus, potentially reducing injury in the long term. This study, along with additional research (3,17,23,25), has highlighted the importance of lumbopelvic training interventions to reduce re-occurring LBP. Therefore, the implementation of isometric based core exercise targeting the trunk area such as the Pallof press may be deemed advantageous for athlete populations, not only for enhanced performance but with the intention to help mitigate LBP over time.

Traditionally core training utilized movement-based exercises such as the traditional abdominal crunch as it placed a high demand on the trunk musculature (abdominals in particular) (4,9,18,38). Although such exercises provide concentric contractions for the rectus abdominus muscle, repeated flexion of the spine has also been linked to excessive shear and compressive forces (5,8,18,19,35). When dynamic based trunk exercises (e.g., crunch) were compared to isometric based exercises (e.g., front plank), Lee et al. (18) found that the use of an isometric intervention was superior at enhancing torso stiffness over a 6-week trial. It was stated that time under tension (TUT) may have been a contributing factor to this improvement. The use of such exercises resulted in a higher tolerance to pain, thus a potentially better treatment protocol for LBP. McGill (20) also suggested that the function of the trunk musculature is to co-contract and stiffen to prevent excess motion and recommended to train this region as stabilizers and not as prime movers.

Therefore, it would be beneficial for both athletes and general populations to perform isometric based core exercises such as the Pallof press in their training programs. The purpose of this article is to describe the benefits of the Pallof press exercise providing practitioners with examples on how to progress or regress depending on competency level.

EXERCISE BENEFITS

The Pallof press is an isometric based core exercise and can be used to develop trunk stability among both athletic and general populations. By utilizing this exercise, one learns how to brace and maintain proper alignment and stability of the spine. This trunk stiffness allows for the transfer of maximum force between the lower body and shoulders, allowing for enhanced distal segment athleticism and limb speed, which can aid in actions such as throwing, jumping, pushing, and pulling

(15,18,20,23,32,37). Isometric based exercises such as the Pallof press challenges the core through braced positions with minimal risk, in comparison to dynamically based exercises such as the traditional abdominal crunch, which can cause repetitive flexion movements of the spine, potentially leading to injury (5,23,38). When considering the Pallof press, practitioners can start at the intermediate level as outlined in Table 2 and gradually progress or regress through the continuum, as is deemed required for enhanced trunk development, a system that has been previously suggested for other core exercises (23).

EXERCISE TECHNIQUE

The Pallof press is considered a transverse plane or trunk rotation exercise and can be performed through the use of a resistance band or a cable machine (22). As outlined by McGill (20) and Axler et al. (2), it is more beneficial to perform the isometric version of this exercise than the dynamic version due to the minimized risk of LBP (2,20). Therefore, the Pallof press might be better termed as an anti-rotation exercise due to its isometric nature, as outlined by Porterfield et al. (26). At the start of the exercise, if one is not using the cable machine, ensure the resistance band is fastened to a non-moveable apparatus, such as a squat rack. Ensure that the band or cable machine is fixed to approximately the mid-torso level. The starting position for the exercise is shown in Figure 1, with the athlete holding a quarter squat position (hands held close to the midline, and the band stretched to ensure sufficient tension). Feet should be positioned shoulder-width apart, with the toes pointing straight ahead, and the head in a neutral position, with eyes looking forward. To begin the movement, slowly extend and press the hands away from the torso, ensuring not to lock out the elbows (Figure 2). This position is held before the elbows are flexed, and the hands brought back into the original starting position (Figure 1).

During each repetition, the movement should be performed in a slow and controlled fashion while also keeping the core or trunk musculature braced, maintaining a neutral spinal position. The wrist must be held in a neutral position while holding the long lever position (Figure 2) as an inability to maintain this position may lead to excessive wrist extension. Both athletes and general populations should be encouraged by the practitioner to breathe in at the start position (Figure 1) and breathe out on returning. If pain is experienced during performance of this exercise, it is recommended that the participant first reduce the intensity of the exercise by either reducing the weight used or the tension of the band. If pain persists, a medical professional should be sought out for advice. Isometric based core exercises such as the Pallof press should not cause new or re-occurring pain other than normal delayed onset muscular soreness, and a health care provider should clear individuals who suffer from LBP before performing this exercise. Key coaching points for each position are outlined in table 1.

***** INSERT TABLE 1 ABOUT HERE *****

***** INSERT FIGURE 1-2 ABOUT HERE *****

PROGRESSING AND REGRESSING THE PALLOF PRESS

The use of exercise progression and regression, to ensure that the exercise is performed correctly and a sufficient stimulus is provided, is essential in programming (23). The implementation of such progressions safely and appropriately is of utmost importance to ensure one reaches their training goals (22). Models for the progression of isometric based core exercises have been proposed in previous research (11,17,22); therefore, this article has outlined a proposed progression and regression continuum for the Pallof press (Table 2). The authors recommend that participants begin on level 5 (quarter squat dynamic lever) so that practitioners can adjust the level of exercise depending on the quality of movement. Progression up the continuum should only be carried out once the participant has completed the desired number of repetitions with acceptable form. Working up the levels involves the athlete to progress from a kneeling position to a quarter squat, and then finishing in a lunge pattern. In regards to the lever position, a progression from dynamic, to isometric to mini-circles is recommended). This requires participants to progress up to 3 seconds of TUT per repetition. The coach intrusion level of this continuum requires the practitioner to provide a reactive stimulus to progress the exercise further. This is performed by pulling the resistance band into different positions and speeds, providing the reactive stimulus required. As outlined in the previous section, stiffness in the trunk region with a neutral spine position must be maintained at all times.

***** INSERT TABLE 2 ABOUT HERE *****

PRACTICAL APPLICATIONS

Although numerous articles exist relating to the implementation of core exercises within an S&C program, little or no literature is available on the Pallof press exercise. The proposed continuum outlined in Table 2 will provide practitioners with a basic progression model when implementing this exercise. Along with the progression continuum provided, this article also provides readers with programming recommendations as outlined in Table 3, to help athletes and general populations develop core stability around the trunk area. The progression from a seated position to a standing position is recommended by Cook et al. (7) as the seated and half-kneeling positions require less hip and leg musculature. As outlined by Lee et al. (18), TUT plays a significant role in enhancing torso stiffness; therefore, the progression from a dynamic lever to an isometric, long lever is recommended, due to a longer TUT. The progressive nature of repetitions set out in Table 3 is recommended to progressively develop both endurance and stability around the trunk region (20,23).

***** INSERT TABLE 3 ABOUT HERE *****

***** INSERT FIGURE 3-7 ABOUT HERE *****

CONCLUSION

The use of isometric based core exercises such as the Pallof press has been identified to provide adequate stiffness to the trunk region along with minimizing spinal loading. The objective of this article is to provide practitioners with options on how to progress and regress this exercise. It is recommended that once the participant has mastered the exercise, progressions can be provided in a multitude of ways. Practitioners are encouraged to utilize the continuum outlined in this article to enhance core and spinal stability, via the use of the Pallof press exercise.

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Table 1. Key coaching points for each Pallof press position.

Seated Position	Feet are planted flat on the floor, toes pointing straight ahead
	Knees are flexed to 90°
	Upper body is maintained upright with head in a neutral position
Half-Kneeling	Back knee is placed on the floor to aid stability
	Front knee is flexed at 90° and is in line with the leading foot
	Ensure a neutral spine position with the head in a neutral position
1/4 Squat Position	Feet are planted shoulder-width apart, toes pointing straight ahead
	Athletic position is held with knees tracking over toes
	Ensure trunk musculature is braced, maintaining a neutral spine position
Lunge Position	Lunge position is held with the back knee raised off the floor
	Leading toes pointing straight ahead with the front knee flexed at 90°
	Upper body is maintained upright with trunk musculature braced
Upper Body	Slow controlled movement for each repetition
	Ensure wrists are maintained in neutral in the long lever position
	Breathe in at start position and breathe out on returning

Table 2. Suggested Pallof press continuum.

Beginner	1	Seated Dynamic Lever (Figure 3)
	2	Seated Long Lever (3 sec ISO Hold)
	3	Half-Kneeling Dynamic Lever (Figure 4-5)
Intermediate	4	Half-Kneeling Long Lever (3 sec ISO Hold)
	5	1/4 Squat Dynamic Lever (Figure 1-2)
	6	1/4 Squat Long Lever (3 sec ISO Hold)
Advanced	7	Lunge Dynamic Lever
	8	Lunge Long Lever (3 sec ISO Hold) (Figure 6-7)
	9	Lunge Long Lever (4 sec mini circles)
Advanced (Coach Intrusion)	10	Squat Dynamic Lever (coach intervention)
	11	Lunge Dynamic Lever (coach intervention)
	12	Lunge Long Lever (ISO Hold) (coach intervention)

Table 3. Suggested programming for the Pallof press.

Beginner	Intermediate	Advanced
Level: 1-3	Level: 4-6	Level: 7-12
Reps: 6-10	Reps: 8-12	Reps: 12-15
Sets: 2	Sets: 3	Sets: 3
W:R = 1:1	W:R = 1:1	W:R = 1:1
Frequency: 2-3 x per week	Frequency: 2-3 x per week	Frequency: 2-3 x per week

W:R = work to rest ratio

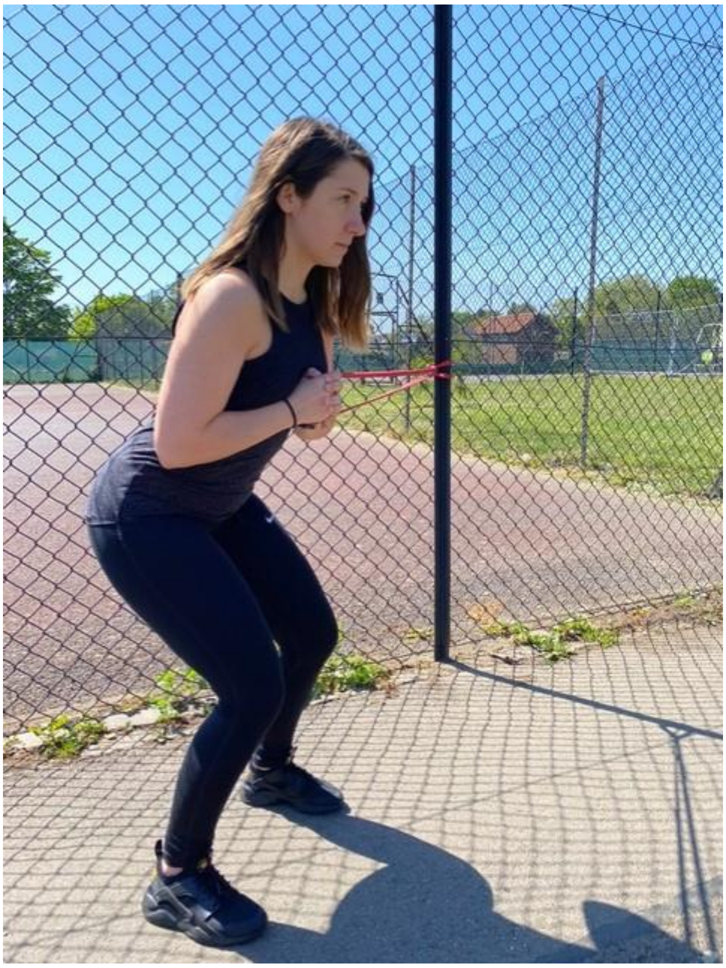

Figure 1. ¼ squat Pallof press start position.

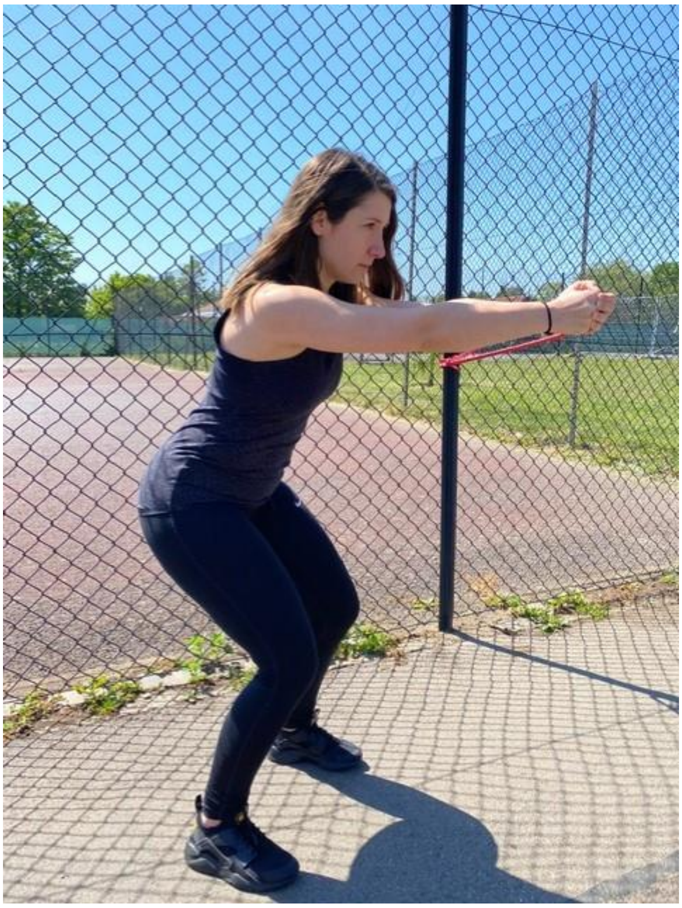

Figure 2. ¼ squat Pallof press end position.

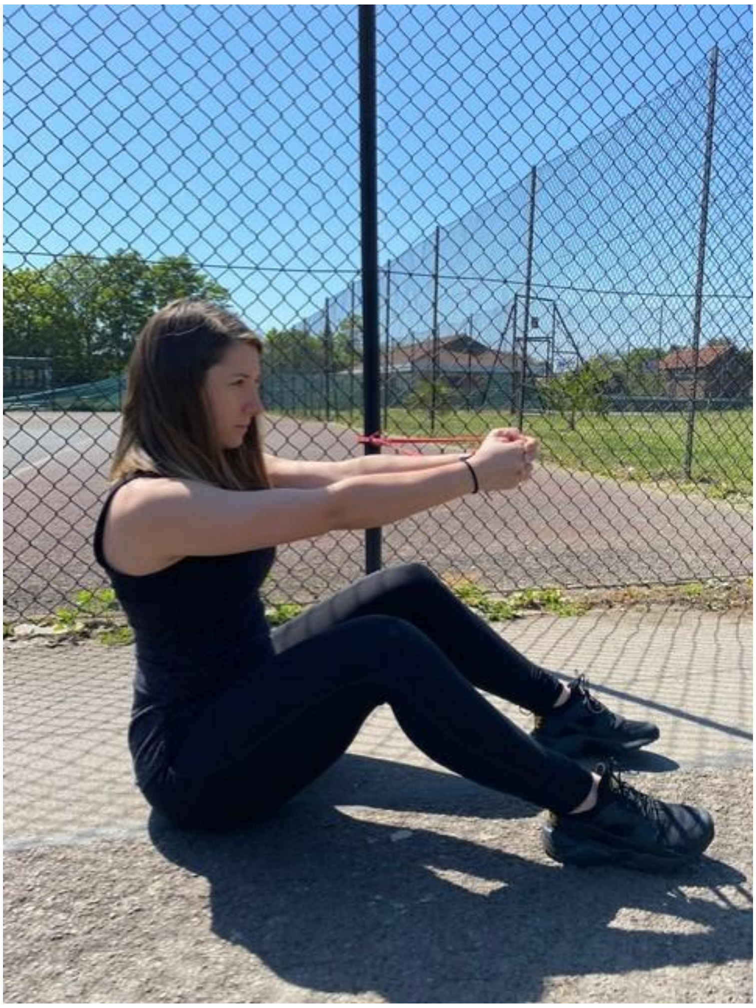

Figure 3. Seated Pallof press end position.

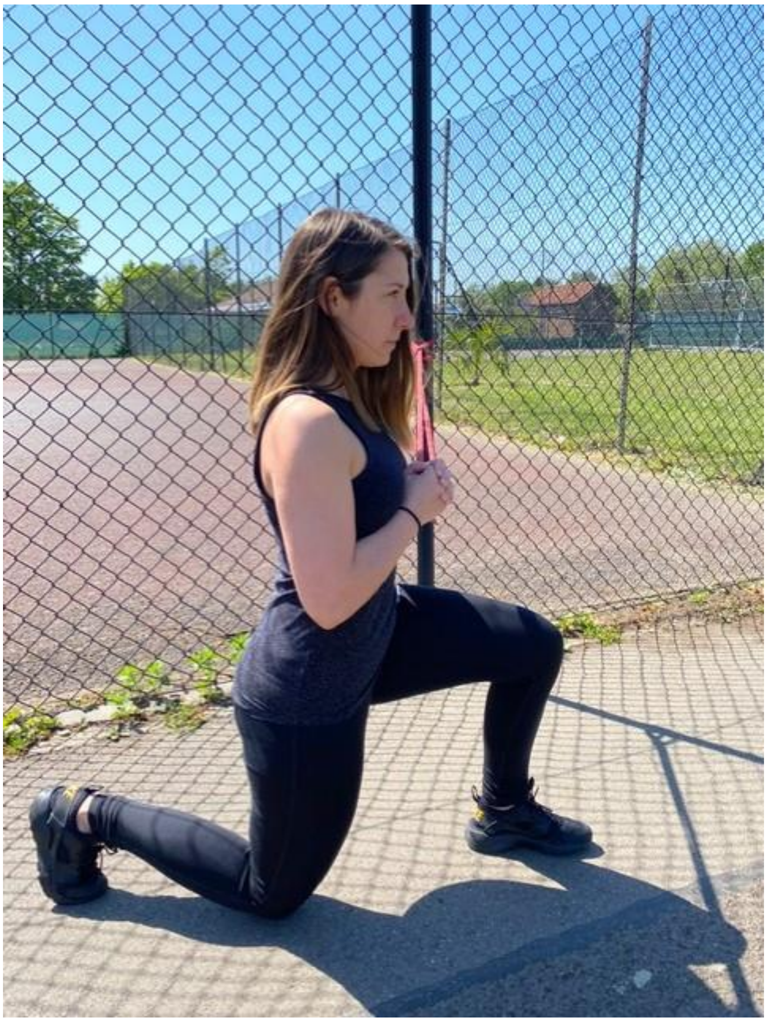

Figure 4. Half-kneeling Pallof press start position.

Figure 5. Half-kneeling Pallof press end position.

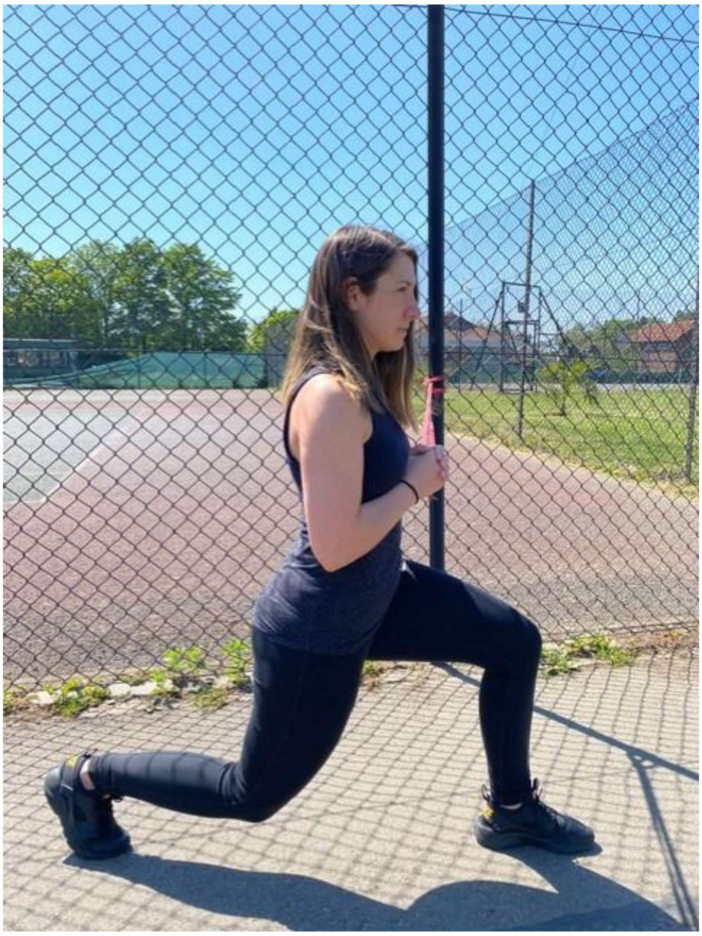

Figure 6. Lunge Pallof press start position.

Figure 7. Lunge Pallof press end position.