

GLUTEUS MEDIUS WEAKNESS AND ITS RELATIONSHIP WITH PATELLOFEMORAL PAIN SYNDROME

Management of Sports Injuries and Sports Specific Rehabilitation

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INTRODUCTION

- ▶ Gluteus Medius dysfunction is one of the most common causes of lower limb injury presenting to the sports injury clinic (Burnet and Pidcoe 2009).
- ▶ Running is one of the most common sports to present with patellofemoral pain syndrome (PFPS) (Ferber et al 2011 and Willson et al 2011)
- ▶ 70-80% of runners will suffer from an overuse injury at some stage in their career (Niemuth et al 2005).
- ▶ Research has suggested a need for specific examination and treatment strategies to effectively manage this condition (Nakagawa et al 2008 and Boling et al 2006).
- ▶ Weakness in the Gluteus Medius muscle has been found to reduce athletic performance and increase the risk of injury (Burnet and Pidcoe 2009).

CASE PRESENTATION

- ▶ 37 Year old female marathon runner, presented with diffuse poorly localized pain on the anterior aspect of the R knee.
- ▶ Gradual onset, for the last 4 months, which is painful during activity, climbing stairs, sitting for long periods and kneeling.
- ▶ Training for a marathon and is an accountant who sits at a desk for up to 14hrs a day.
- ▶ Stretches post activity, doesn't perform any strength training or core stability exercises.
- ▶ Patient has no referred pain, has been correctly fitted for running shoes and has had no other injuries.

LITERATURE SEARCH

- ▶ A primary search was applied in PubMed with the key words (Gluteus Medius, Hip Abductors, Gluteal Muscle Weakness, Gluteus medius and Patellofemoral and Trendelenberg Test).
- ▶ The search revealed 1200 results
- ▶ Once limits were applied this number was reduced to 79
- ▶ The abstract of each paper was reviewed and once deemed suitable the entire article was read.
- ▶ A total of 14 articles were utilized in the present case
- ▶ The reference page of each article was read for any further articles, which revealed a further 5 articles.

LITERATURE SEARCH

Key Words	Results	Limits Applied Results
Gluteus Medius	696	29
Hip Abductors	272	16
Gluteal Muscle Weakness	32	1
Gluteus medius and Patellofemoral	12	6
Trendelenberg Test	188	27

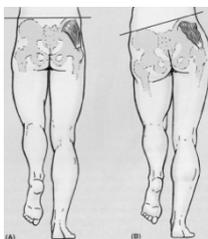
Results were limited to Clinical trials, Meta-Analysis, Randomized Control Trials and Reviews. Participants were limited to adult, female aged 19-44.

KEY RESEARCH FINDINGS

- ▶ Early research has focused on the injured joint or structures distal to the injury.
- ▶ Recent literature has eluded to the implication of gluteus medius weakness on the development of PFPS.
- ▶ Women are at higher risk of developing Patellofemoral pain than men (Cichanowski et al 2007).
- ▶ Due to the repetitive nature of running, overuse injuries such as PFPS are more common (Willson et al 2011).
- ▶ There are a number of exercises documented to strengthen the gluteus medius, it is difficult to determine which are the most effective (Distefano et al 2009)

EXAMINATION

- ▶ Tenderness on medial aspect of the patella
- ▶ Pain on testing the quadriceps
- ▶ Squat revealed medial rotation of both femurs
- ▶ Trendelenberg test was positive on both sides, more marked on the right.
- ▶ Single leg squat was painful in anterior knee.
- ▶ Weakness on side lying resisted abduction
- ▶ Gait analysis revealed a trendelenberg gait.



HIP STRENGTH AND PATELLOFEMORAL PAIN SYNDROME

Study	Participants	Outcome Measure	Results
Cichanowski, Schmitt, Johnson and Neimuth (2007)	26 Participants (13 with and 13 without PFPS)	Hip strength of flexors/ extensors, abductors/ adductors, and internal/ external rotators using hand held dynamometer	Abductor and internal rotation was significantly weaker in the symptomatic patients
Souza and Powers (2009)	41 Participants (21 with and 20 without PFPS)	3D Kinematic analysis of 3 tasks (Running, Drop Jump and a step down maneuver) and Strength of Hip extension and abduction	Participants with PFPS had increased internal rotation, 14% reduced abduction and 17% reduced extension than non symptomatic patients

HIP STRENGTH AND PATELLOFEMORAL PAIN SYNDROME

Study	Participants	Outcome Measures	Results
Willson, Kermozeck, Arndt, Reznicek and Straker (2011)	40 Participants (20 with and 20 without PFPS)	Looked at the activation of the gluteus medius and maximus activation using EMG	Participants with PFPS had delayed and shorter gluteus medius activation. The symptomatic participants also had increased internal rotation and adduction
Ireland, Willson, Ballantyne and Davis (2003)	30 Participants (15 with and 15 without PFPS)	Evaluated hip abduction and external rotation strength	Patients with PFPS demonstrated reduced hip abduction 26% and internal rotation 36% than non-symptomatic participants.

INITIAL TREATMENT PLAN

- ▶ Massage to the quads, ITB, hamstrings, adductors and Gastroc/soleus (Fritz 2005)
- ▶ Stretches for the above muscle groups (Armiger and Martyn 2010)
- ▶ Strengthening exercises for the hip musculature and the quadriceps
 - ▶ Towel Extension 3x10
 - ▶ Side lying hip abduction 3x10 (Distefano et al 2009)
 - ▶ Squats with band around knee 3x10
 - ▶ Prone bridge 5x5sec holds
- ▶ Exercises to be performed 2xweekly (Position Stand ACSM 2009)

MANAGEMENT

- ▶ A progressive strengthening program was applied to the patient, focusing on the gluteal muscles, quadriceps, hamstrings and Gastroc/soleus complex.
 - ▶ Increasing complexity and resistance of exercises where necessary.
- ▶ Flexibility work on all the key muscles.
- ▶ The patient was seen fortnightly to evaluate treatment effectiveness and progress exercises where necessary.
- ▶ The patients running technique was evaluated pre and post intervention via video analysis.

FOLLOW UP

- ▶ The patient complied with the rehabilitation program provided, she completed 90% of the sessions.
- ▶ The patients pain has almost gone when doing most activities, she still has slight tenderness when kneeling.
- ▶ Video analysis revealed a marked improvement in gluteus medius control and a reduced trendelenberg gait pattern.
- ▶ Resisted abduction had improved, patient was able to withstand resistance.
- ▶ The patient has returned to pain free running and has resumed training for her marathon.

PATELLOFEMORAL PAIN AND GLUTEUS MEDIUS WEAKNESS REHABILITATION

Study	Participants	Outcome measures	Results
Mascal, Landel and Powers (2003)	Case study of 2 females	14 week rehabilitation program focusing on the recruitment and endurance training of pelvis, hip and trunk musculature, patient function, pain and lower extremity kinematics were evaluated pre and post intervention	Both patients had decreased pain, improved kinematics and gluteus medius function improved 50% in patient A and 90% in patient B
Nakagawa, Muniz, Baldon, Mascal, Reiff and Serrao (2008)	14 participants with PFFS 7 intervention (with Hip Strength) 7 control (only Traditional PFFS treatment)	6 week home exercise program, focusing on either PFFS rehabilitation alone or additional hip abduction and lateral rotation strength exercises.	The intervention group improved in perceived pain levels and gluteus medius EMG activity. Both rehabilitation protocols were found to be effective, however it was determined that the addition of hip strengthening was beneficial.

PATELLOFEMORAL PAIN AND GLUTEUS MEDIUS WEAKNESS REHABILITATION

Study	Participants	Outcome measures	Results
Fukuda, Rossetto, Magalhaes, Bryk, Lucareli and Carvalho (2010)	70 participants (22 Knee rehabilitation only, 23 Knee and additional hip strengthening and 25 control)	Influence of additional strengthening to the hip abductor and lateral rotator in PFFS patients. Pre and post pain, LEFS and AKFS were completed.	Both the knee and the knee/hip groups improved in strength and other measurements, even though no statistical differences were found between the knee and knee/hip it was still recommended to implement hip strengthening into PFFS rehabilitation
Ferber, Kendall and Farr (2011)	25 participants (15 with and 10 without PFFS)	3 week hip strengthening program in patients with PFFS	At baseline the PFFS patients had reduced strength, after the 3 weeks the PFFS patients had reduced pain and improved strength compared to the control

REFLECTION

- ▶ In past have tended to look at single joints as they present, this case has indicated the need to look further than the patients presentation.
- ▶ Conducting a functional examination alongside the physical one.
- ▶ Time with the patient is limited to fortnightly due to cost.
- ▶ Equipment availability/cost

CONCLUSION

- ▶ Relationship hip strength has with lower limb injury is fairly new
- ▶ Research is mixed with regard to the best protocol to treat PFFS
- ▶ One key issue that emerged was which came first, the PFFS due to the gluteal weakness or the weakness due to pain and dysfunction of the PFFS?
- ▶ Further research is required utilizing larger samples, longer rehabilitation duration and long term follow up.
- ▶ While the research is in its infancy it does highlight the need to look at the entire kinetic chain when examining the injured patient, and further research will only develop this understanding.

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