Thank You

- Thanks to 2018 CHICAGO SPORTS MEDICINE SYMPOSIUM for the kind invitation to share this information .

- It is an honor and privilege to be invited to participate and thank you for your time .

George J. Davies, DPT,ATC,CSCS
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Sports Physical Therapist:
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Rehabilitation for Patellofemoral Problems:

It's Complicated!!!

DISORDERS OF THE PATELLA-FEMORAL ARTICULATION

Pathogenesis, Diagnosis & Treatment

PF Treatment-in 6 minutes!!!

- Objectives:
- 1. Introduction and background information
- 2. Examination of patient and PFJ
- 3. International consensus on treatments based on best evidence
- 4. Exercise, exercise, exercise
- 5. But how….

PF Treatment

- Treating patients with AKP is often frustrating, both for the orthopaedic surgeon and for the physical therapist.

Sanchis-Alfonso, V, et.al…Fulkerson, JP. Diagnosis and treatment of Anterior knee pain. JISAKOS. 1-13, 2016

PF Treatment

70-90% of individuals with AKP have recurrent or chronic pain

Powers, CM, et.al. PF pain: proximal, distal, and local Factors, 2nd International Research Retreat. JOSPT. 42:A1-54, 2012

PF Treatment

40% unfavorable recovery at 12 months after the initial diagnosis

Collins, NJ, et.al. Prognostic factors for PFP: a multi-center Observational analysis. BJSM. 47:227-233, 2013

PF Treatment

- Patients with AKP may also have an increased risk of developing PF – OA and no cure !!!
- AKP has a negative impact on the patient's quality of life

Crossley, KM. Is PF OA a common sequela of PFP? BJSM. 48:409-410, 2014

PF Treatment

- Because of the complex multifactorial etiology of AKP, with local, proximal, and distal factors potentially involved, its treatment is particularly difficult and challenging for the practitioner

Sanchis-Alfonso, V, et.al...Fulkerson, JP. Diagnosis and treatment of Anterior knee pain. JISAKOS. 1-13, 2016

PF Treatment

- Arriving at a precise diagnosis is the cornerstone of developing an appropriate treatment
- Given that the etiology of AKP is multifactorial, individualized treatment must be tailored to the patient

Sanchis-Alfonso, V, et.al…Fulkerson, JP. Diagnosis and treatment of Anterior knee pain. JISAKOS. 1-13, 2016

PF Treatment

- Since AKP is a multifactorial problem, non-operative management depends on the examination findings.
- Multimodal physiotherapy programs are effective in reducing AKP symptoms

Crossley, K, et.al. AJSM, 30:857-65, 2002
Cowan, SM, et.al. MSSE, 34:1879-85, 2002

PFJR Forces

Safe zone For OKC & CKC ex.

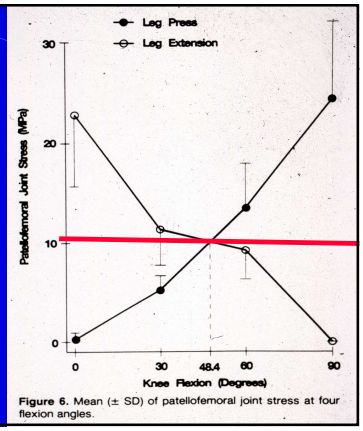


Figure 6. Mean (± SD) of patellofemoral joint stress at four flexion angles.

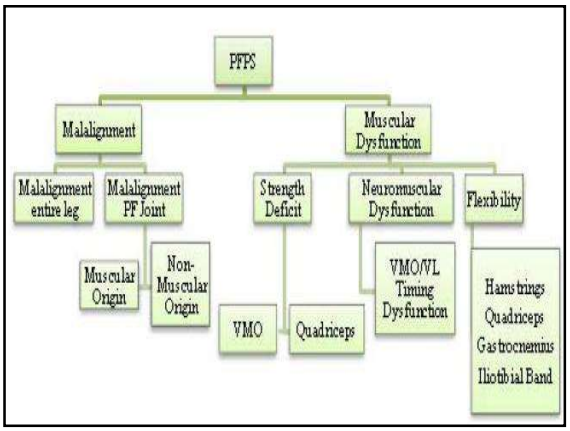
PF Examination

Manske, RC, Davies, GJ. A nonsurgical approach to Examination and treatment of the patellofemoral joint, Part 1: Examination of the PFJ. Crit Rev Phys Rehabil Med. 15(2):141-166, 2003

Manske, RC, Davies, GJ. Examination of the Patellofemoral Joint. IJSPT. 11(6):831-854, 2016

Treat the cause

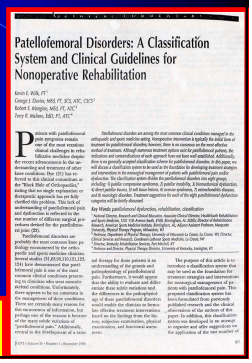
- The key to treating patients with PFPS is to treat the CAUSE and not just the SYMPTOMS



Reference

- Wilk, K, Davies, GJ, Mangine, R, Malone, T
- Patellofemoral disorders:
- A classification system and clinical guidelines for
- nonoperative rehabilitation.
- JOSPT, 28:307-322, 1998

Start of clinical prediction rules


Patellofemoral Disorders: A Classification System and Clinical Guidelines for Nonoperative Rehabilitation

PF CLASSIFICATIONS

- Patellar compression syndromes
- Patellar instability
- Biomechanical dysfunctions
- Direct patellar trauma
- Soft tissue lesions
- Overuse syndromes
- Osteochondritis diseases
- Neurological disorders

PF Rehabilitation

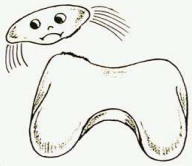
- So how do we treat PFPS ???

- Lets go to the literature to find out !

PF Rehabilitation

- Google – 257,000 hits
- Google scholar – 12,200
- PubMed – 38
- Think there is some variety??

PF REHABILITATION



DISORDERS OF THE PATELLA-FEMORAL ARTICULATION

Pathogenesis, Diagnosis & Treatment

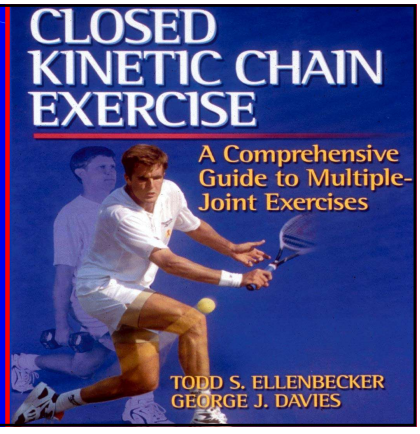
If you want to use "your best treatment" interventions to treat the patient with PFPS , you can probably find some literature to support your clinical decisions.....

PF Treatment

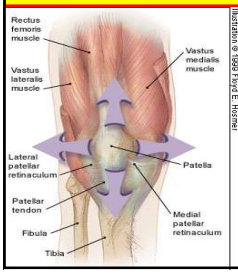
- There is no evidence that a single treatment modality works for all patients with patellofemoral pain. There is limited evidence that some treatment modalities may be beneficial for some subgroups of patients with patellofemoral pain.

Saltychev, M, et.al. Effectiveness of conservative treatment For PFPS: a systematic review and meta-analysis. J Rehab Med. 50(5):393-401, 2018

2001



Physiotherapy Canada, 2001



Selective activation of the vastus medialis oblique: What does the literature really tell us?

George J. Davies
Robert C. Manske
Karen Cooley
Diana Fletcher-Klos
Pam Johnson-Stuhr

Key Words
Vastus Medialis Oblique, Patellofemoral Pain, Anterior Knee Pain, Knee Rehabilitation

Anterior knee pain is one of the most common knee disorders seen in orthopaedic and sports physical therapy practice. Most articles that describe anterior knee pain rehabilitation emphasize a portion of treatment to the vastus medialis oblique muscle. Although conservative care appears to emphasize treatment of the vastus medialis oblique for patients with anterior knee pain, considerable disagreement exists in regards to treatment strategies and clinical outcomes. Furthermore, selective activation of the vastus medialis oblique has been proposed, yet remains to be a controversial rehabilitation treatment method. This article provides an overview of the scientific literature regarding the selective activation of the vastus medialis oblique, and based upon this literature, makes recommendations regarding application of selective vastus medialis oblique exercises to design a conservative rehabilitation program.

Le douleur du genou antérieur est l'un des troubles du genou les plus fréquents vus dans la pratique de l'orthopédie et de la physiothérapie du sport. La plupart des articles qui décrivent le traitement de la douleur du genou antérieur mettent l'accent sur une partie du traitement s'appliquant au muscle vaste interne oblique du membre inférieur. Bien que les thérapies conservatrices semblent accorder de l'importance au traitement du muscle vaste interne oblique du membre inférieur chez les patients souffrant de douleur du genou antérieur, les stratégies thérapeutiques et les résultats cliniques font l'objet de désaccords considérables. De plus, on a proposé l'activation sélective du muscle vaste interne oblique, mais cela demeure une méthode thérapeutique controversée. Cet article fournit un aperçu de la documentation scientifique sur l'activation sélective du muscle vaste interne oblique du membre inférieur et sur la base de cette documentation, fait des recommandations concernant l'utilisation d'exercices sélectifs au niveau du muscle vaste interne oblique du membre inférieur pour élaborer un programme de réadaptation.

234 references

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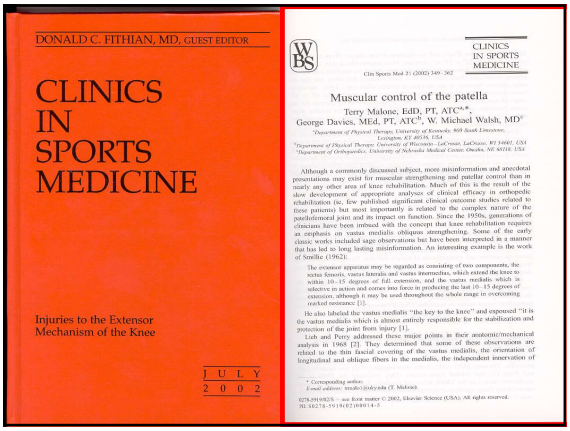
Pam Johnson-Stuhr, BS, PT, ATC, CSCS, Gundersen Lutheran Sports Medicine

Correspondence: Robert C. Manske, Via Clinical Doctorate and Sports Physical Therapy, Wichita State University Department of Physical Therapy, 1845 N. Fairmount, Wichita, Kansas 67260-0043

Rehab for VMO



CLINICS IN SPORTS MEDICINE
Clin Sports Med 21 (2002) 349–362

Muscular control of the patella

Terry Malone, EdD, PT, ATC[a,*],
George Davies, MEd, PT, ATC[b], W. Michael Walsh, MD[c]
[a]Department of Physical Therapy, University of Kentucky, 809 South Limestone, Lexington, KY 40536, USA
[b]Department of Physical Therapy, University of Wisconsin – LaCrosse, LaCrosse, WI 54601, USA
[c]Department of Orthopaedics, University of Nebraska Medical Center, Omaha, NE 68198, USA

Although a commonly discussed subject, more misinformation and anecdotal presentations may exist for muscular strengthening and patellar control than in nearly any other area of knee rehabilitation. Much of this is the result of the slow development of appropriate analyses of clinical efficacy in orthopedic rehabilitation (ie, few published significant clinical outcome studies related to these patients) but most importantly is related to the complex nature of the patellofemoral joint and its impact on function. Since the 1950s, generations of clinicians have been imbued with the concept that knee rehabilitation requires an emphasis on vastus medialis obliquus strengthening. Some of the early classic works included sage observations but have been interpreted in a manner that has led to long lasting misinformation. An interesting example is the work of Smellie (1962):

> The extensor apparatus may be regarded as consisting of two components, the rectus femoris, vastus lateralis and vastus intermedius, which extend the knee to within 10–15 degrees of full extension, and the vastus medialis which is selective in action and comes into force in producing the last 10–15 degrees of extension, although it may be used throughout the whole range in overcoming marked resistance [1].

He also labeled the vastus medialis "the key to the knee" and expressed "it is the vastus medialis which is almost entirely responsible for the stabilization and protection of the joint from injury [1].

Lieb and Perry addressed three major points in their anatomic/mechanical analysis in 1968 [2]. They determined that some of these observations are related to the thin fascial covering of the vastus medialis, the orientation of longitudinal and oblique fibers in the medialis, the independent innervation of

* Corresponding author.
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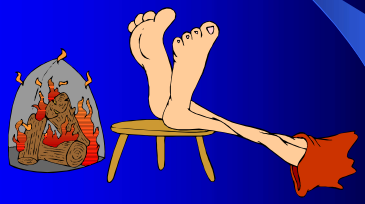
PII: S0278-5919(02)00014-5

TLS
Total Leg Strength



Rehabilitation

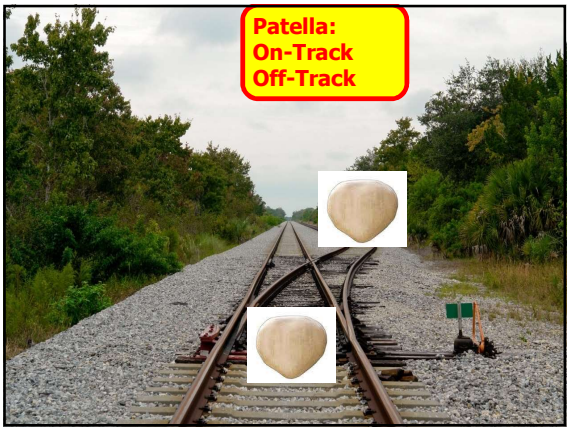
- Of the
- HIP muscles

Knee Injuries and Hip Weakness & Strengthening Exercises

Nguyena AD, et.al. J Sport Rehabil. 2016 Aug 24:1-23
Teng HL, Powers CM. J Athl Train. 2016 Jul;51(7):519-24
Lehnert M, et.al. Scand J Med Sci Sports. 2016
Dingenen B, et.al. Clin Biomech. 2016 35:116-23
Kondo H, et.al. J Phys Ther Sci. 2016 Jan;28(2):319-25
Cronström A, et.al. Sports Med. 2016 46(11):1647-1662
Kollock RO, et.al. J Athl Train. 2016 51(11):919-926
Khayambashi K, et.al. Am J Sports Med. 2016 44(2):355-61
Luedke LE, et.al. Int J Sports Phys Ther. 2015 10(6):868-7
Dingenen B, et.al. Hum Mov Sci. 2015 44:234-45
Berry JW, et.al. JOSPT. 2015 45(9):675-82
Kim D, et.al. PM&R. 2016 8(2):138-44
Palmer K, et.al. BMC Musculoskelet Disord. 2015 3;16:105
Dai B, et.al. J Biomech. 2014 28;47(15):3674-80
Ferber R, et.al. J Athl Train. 2015 50(4):366-77.

Hip Exercises for Knee Conditions

Teng HL, Powers CM. Hip-Extensor Strength, Trunk Posture, and Use of the Knee-Extensor Muscles During Running. J Athl Train. 2016 Jul;51(7):519-24.
Selkowitz DM, Beneck GJ, Powers CM. Comparison of EMG Activity of the Superior and Inferior Portions of the Gluteus Maximus Muscle During Common Therapeutic Exercises. J Orthop Sports Phys Ther. 2016 Sep;46(9):794-9



A Study of Thigh Muscle Weakness in Different Pathological States of the Lower Extremity.

Nicholas, JA, et al

Am J Sports Med 4(6): 241-248, 1976

42 years ago…..

Thorough Isokinetic Testing of these Muscles will reveal their weakness

Isokinetic Testing

- Hip Abduction
- Hip Adduction
- Hip Flexion
- Knee Extension
- Knee Flexion
- Ankle Plantar Flexion
- Ankle Dorsi Flexion

Patello-Femoral Lesions

1. Ipsilateral weakness – quadriceps ($p < 0.005$)
2. Ipsilateral weakness – hamstrings ($p < 0.01$)
3. Ipsilateral weakness – hip flexors ($p < 0.005$)
4. Ipsilateral weakness – hip abductors (NS - Trend)
5. Ipsilateral weakness – hip adductors (NS - Trend)

PF Treatment

- Patients with more pain, better function, greater lateral core endurance, and less anterior core endurance were more likely to have a successful outcome after hip and core strengthening (88% sensitivity and 54% specificity).

Earl-Boehm, JE, et.al. Treatment Success of Hip and Core or Knee Strengthening for Patellofemoral Pain: Development of Clinical Prediction Rules. JAT, 2018;53(6)

PF Treatment

- Patients with lower weight, weaker hip internal rotation, stronger hip extension, and greater trunk-extension endurance were more likely to have success after knee strengthening (82% sensitivity and 58% specificity).

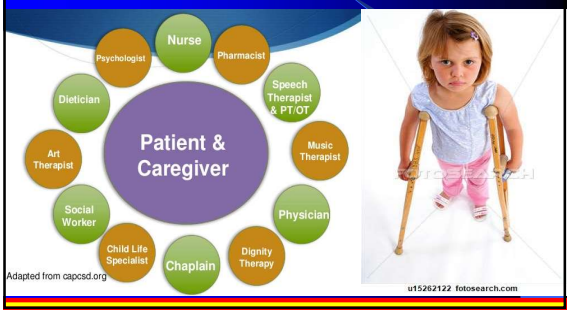
Earl-Boehm, JE, et.al. Treatment Success of Hip and Core or Knee Strengthening for Patellofemoral Pain: Development of Clinical Prediction Rules. JAT, 2018;53(6)

PF Treatment

- Since AKP is a multifactorial problem, non-operative management depends on the examination findings
- A multi-modal PT program is effective in reducing AKP symptoms
- 1) unload the painful soft tissue around patella (LOCAL)
- 2) improve PF tracking (LOCAL)
- 3) optimize the LE mechanics (Proximal)(Distal)

Knee Rehabilitation:

- Bio-Psycho-Social Rehabilitation

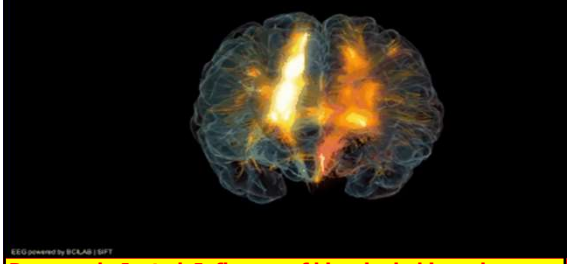


PF Rehab-Outcomes

- CONCLUSION:
- Change in fear-avoidance beliefs about physical activity was the strongest predictor of function and pain outcome.
- The fact that patients who decreased their fear-avoidance beliefs improved function and decreased pain indicates that perhaps fear-avoidance beliefs should be targeted during the treatment of patients with patellofemoral pain syndrome.

Piva SR, et.al. Predictors of pain and function outcome after rehabilitation in patients with patellofemoral pain syndrome. J Rehabil Med. 2009 Jul;41(8):604-12.

PF Treatment



Domenech, J, et.al. Influence of kinesiophobia and Catastrophizing on pain and disability in AKP patients. Knee Surg Sports Traumatol Arthrosc. 21: 1562-8, 2013

PF Treatment

- Patient education
- Buy in to program
- Compliance

Sanchis-Alfonso, V, et.al…Fulkerson, JP. Diagnosis and treatment of Anterior knee pain. JISAKOS. 1-13, 2016

PF Treatment

- International Patellofemoral Research Network (www. ipfrn. org)

Collins, NJ, et.al. 2018 Consensus statement on exercise therapy and physical interventions (orthoses, taping and manual therapy) to treat patellofemoral pain: recommendations from the 5th International Patellofemoral Pain Research Retreat, Gold Coast, Australia, 2017.
Br J Sports Med 2018;0:1–9

Recommendations from the Expert Panel

PF Rehabilitation

- 1. Exercise therapy is recommended to reduce pain in the short, medium and long terms and improve function in the medium and long terms.
- 2. Combining hip and knee exercises is recommended to reduce pain and improve function in the short, medium and long terms, and this combination should be used in preference to knee exercises alone.
- 3. Combined interventions are recommended to reduce pain in adults with patellofemoral pain in the short and medium terms. Combined interventions as a management programme incorporates exercise therapy as well as one of the following: foot orthoses, patellar taping or manual therapy.
- 4. Foot orthoses are recommended to reduce pain in the short term.
- 5. Patellofemoral, knee and lumbar mobilizations are not recommended in isolation.
- 6. Electro-physical agents are not recommended.

PF Rehabilitation

- 1. Exercise therapy is recommended to reduce pain in the short, medium and long terms and improve function in the medium and long terms.


PF Rehabilitation

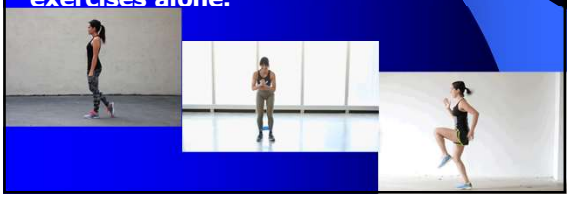
- 1. Exercise therapy is recommended to reduce pain in the short, medium and long terms and improve function in the medium and long terms.


PF Rehabilitation

- 2. Combining hip and knee exercises is recommended to reduce pain and improve function in the short, medium and long terms, and this combination should be used in preference to knee exercises alone.

PF Rehabilitation

- 2. Combining hip and knee exercises is recommended to reduce pain and improve function in the short, medium and long terms, and this combination should be used in preference to knee exercises alone.



PF Rehabilitation

- Movement control training was no more effective than the isolated strengthening protocol in terms of pain, function, muscle strength, or kinematics

Rabelo, NDDA, et.al. Adding motor control training to muscle strengthening did not substantially improve the effects on clinical kinematic outcomes in women with PFP: a randomized controlled trial. Gait Posture, 2017

PF Rehabilitation

- 3. Combined interventions are recommended to reduce pain in adults with patellofemoral pain in the short and medium terms.
- Combined interventions as a management program incorporates exercise therapy as well as one of the following: foot orthoses, patellar taping or manual therapy.

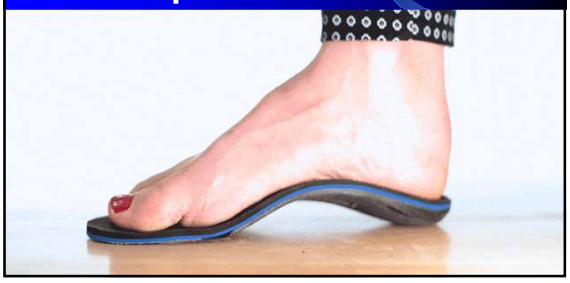
PF Treatment

- Unloading painful tissue around the knee:
- Improves the position of the patella on the femur and decrease the stress through an abnormally loaded structure

Sanchis-Alfonso, V, et.al...Fulkerson, JP. Diagnosis and treatment of Anterior knee pain. JISAKOS. 1-13, 2016

PF Rehabilitation

- 4. Foot orthoses are recommended to reduce pain in the short term.



PF Treatment

- PFP is multifactorial and often persistent knee condition
- 16 factors were reported to be associated with a poor outcome
- Longer duration of symptoms the most reported (>4 months)
- Midfoot mobility may predict those who have a successful outcome to foot orthoses

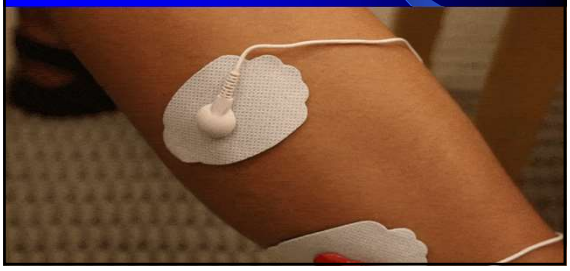
Matthews, M, et.al. Can we predict the outcome for people With PFP? A systematic review on prognostic factors and Treatment effect modifiers. BJSM. 1-12, 2016

PF Rehabilitation

- 5. Patellofemoral, knee and lumbar mobilisations are not recommended in isolation.

PF Rehabilitation

- 6. Electrophysical agents are not recommended.



PF Rehabilitation

- The 2017 consensus meeting also highlighted additional areas of uncertainty, being the use of blood flow restriction training and gait retraining.

PF Rehabilitation

- Exercise therapy remains the intervention of choice for patellofemoral pain

Exercise Dosing with PFP

- Recommendations:
- Various exercises (both OKC and CKC)
- Single session duration: 30-120 minutes
- Total sessions: 12-24 supervised
- Duration: 3-16 weeks
- Outcome measures: Numerous

Young, JL, et.al. The influence of exercise dosing on outcomes in patients with knee disorders: a systematic review. JOSPT. 48(3):146-161, 2016

PF Rehabilitation

PF Rehab-Outcomes

- PROS
- Tampa Kinesiophobia Index
- Kujula Scale
- Pain scales
- Anthropometric measurements
- AROM, PROM
- Strength tests (TLS)
- Qualitative (& quantitative) movement assessments
- Functional tests (jump, hop, LEFT)
- Sport Specific tests

PF Rehab

- However, there is a strong need for basic research on the nature and etiology of PFPS in order to better understand this mysterious syndrome.

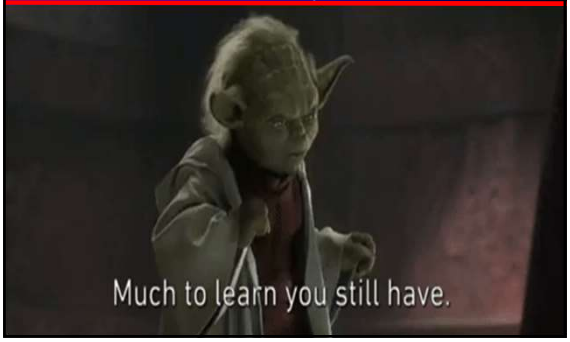
Thomeé R[1], Augustsson J, Karlsson J. Patellofemoral pain syndrome: a review of current issues. Sports Med. 1999 Oct;28(4):245-62.

Experience: 50+ years of treating patients with PFPS

- Other Considerations:
- Core stability
- Balance/proprioception/kinesthesia
- Knee taping/bracing
- Eccentric quadriceps weakness
- Biofeedback training for VMO in CKC
- VMO-VL Imbalance (OLD SCHOOL)
- BFR (NEW SCHOOL)

- George J. Davies

Always learning !!!



Summary And Conclusions

- Rehabilitation for Patellofemoral Problems:
- It's Complicated!!!

DISORDERS OF THE PATELLA-FEMORAL ARTICULATION

Pathogenesis, Diagnosis & Treatment

Congratulations And Thanks To 2018 Chicago Sports Medicine Symposium

Thank  You