Prehabilitation Combined With a Higher Intensity Patient Specific Rehabilitation for Bilateral TKA

Andrew Cook, SPT, CSCS, Dr. Kathleen Swanick, Dr. Stephen Black & Dr. Sean Wells
College of Health Professions, Department of Human Performance and Physical Therapy

INTRODUCTION

According to the American Academy of Orthopaedic Surgeons, more than 600,000 knee replacements are performed every year in the United States (2011). A comprehensive preoperative strengthening program may better prepare the patient for the post-surgical rehabilitation and improve their overall outcomes (Brown, 2010). Saunkook et al. (2012) performed a study showing preoperative quad exercise at least three weeks prior to surgery benefited the patient with decreased pain, improved strength, and improved quality of life after surgery.

Petterson et al. (2009) compared a typical standard of care to a more intense and progressive training program. The control group exhibited worse functional performance at 12 months, took 24% longer on the TUG test, and walked 15% shorter on the 6 minute walk test. Why don't we work these patients harder?

PURPOSE

To determine whether a program consisting of prehabilitation strengthening combined with a higher intensity and patient specific program improves patients outcomes following total knee replacement.

PATIENT DESCRIPTION

The Patient was a 76 year old male who suffered a motor vehicle accident in his early adulthood and has struggled with ongoing knee problems since. Patient was diagnosed with bilateral knee arthritis. The pain and dysfunction greatly affected his daily life.

PRE/POST OPERATIVE MEASURES

Measure	Initial Evaluation	Pre-Op	Post-Op Evaluation	3/5/14
Lower Extremity Functional Scale	40/80	51/80	33.5/80	NA
R Knee Flexion A/PROM	125	121/130	102/113	130
L Knee Flexion A/PROM	110	113/118	81/83	98/108
R Knee Ext A/PROM	8/5	8/0	14/7	6/4
L Knee Ext A/PROM	5	0	11/0	0
Strength	Quads 5/5 with pain	Quads 5/5, pain level 1/10	Quads 4+/5 with pain	Quads 5/5
Palpation/ Observation	Varus deformity B knees, LLE shorter than right	Varus deformity B knees, LLE shorter than right	Midline scars with eschar and mild exudate. Effusion and redness	Eschar gone on R scar, left scar 2 small 2cm eschar spots left. Little effusion
Gait	Modified independent w/ cane	Modified independent w/ cane	Modified independent w/ cane	Independent
Steps	Independent, 6" step	Independent 6" step	4" with MinA and compensatory movements	6" with close guarding and no compensatory movements

	10/18/13	10/20/13	10/23/13	12/2/13	12/4/13	12/11/13
Step-Ups	Level 1 height, 2x10reps	Level 1 height, 2x10reps with added bicep curls with 10lb DB.	Level 1 height, 2x10reps with added bicep curls with 10lb DB.	Agility ladder with weighted vest	Agility ladder with weighted vest	Step Ups with weighted vest at Level 1 height. 2 x 1min
Leg Extension	Left:~~50lbs~~ Right:~~25lb~~ 2 x 15reps	Left:~~50lbs~~ Right:~~25lb~~ 2 x 15reps	Left:~~50lbs~~ Right:~~25lb~~ 2 x 15reps	37.5 lbs R: 2x15 L: 10, 12	37.5 lbs R: 2x12 L: 2x 12	37.5 lbs R: 2x12 L: 2x 12
Leg Curls	Left: 45lbs Right:~~20lb~~ 2 x15 reps	Left: 45lbs Right:~~20lbs~~ 2 x15 reps	Left: 45lbs Right:~~20lbs~~ 2 x15 reps	Leg Press: 90lbs 2 x 20rep	Leg Press: 90lbs 2 x 20rep	Leg Press: 80lbs 2 x 20rep
Squats	Foam pad 2 x 15 reps	Foam pad 2 x 15 reps	~~Dyna~~ Disc 2 x 15 reps	Sit to stand with weight vest, 2 x 10rep	Sit to stand with weight vest, 2 x 10rep	Sit to stand with weight vest, 2 x 10rep
Chest Press	50lbs 2 x 15 reps	55lbs 2 x 15 reps	55lbs 2 x 15 reps	75lbs 2 x10 reps	75lbs 2 x10 reps	75lbs 2 x10 reps
Back Rows	SA rows on foam pad with cable. 2.5 plates for 2 x15 reps	SA rows on foam pad with cable. 2.5 plates for 2 x15 reps	Low row, 2.5 plates on cable system 2 x 15 reps	Low Row, 4 plates on cable system, 2 x 15reps	Low Row, 4 plates on cable system, 2 x 15reps	Mid Row on cable system. 5 plates 2 x 20
Band rotations	Standing trunk rotation, orange resistance band, 2x 20 reps	Standing trunk rotation, orange resistance band, 2x 20 reps	Standing trunk rotation on foam pad, orange resistance band, 2x 20 reps	PNF Ax chops on cable system 3.5 plates 2 x 20reps	PNF Ax chops on cable system 3.5 plates 2 x 20reps	PNF Up-chops on cable system, 1.5 plates 2 x 15 reps
Lat-~~pulldown~~	#7 weight setting, 2 x 12 reps.	#7 weight setting, 2 x 15 reps.	#7 weight setting, 2 x 15 reps.	#8 weight setting, 2 x 15 reps	#8 weight setting, 2 x 15 reps	#8 weight setting, 2 x 15 reps
Lateral walks with resistance band	Resistance tubing around ankles, 2 x 15 reps	Resistance tubing around ankles, 2 x 15 reps	Resistance tubing around ankles, 2 x 20 reps	Lateral steps with sports resistance band. 2 x 50ft	Lateral steps with sports resistance band. 2 x 50ft	Lateral steps with sports resistance band. 2 x 50ft
				Bench dips with weighted vest. 2 x 15reps	Bench dips with weighted vest. 2 x 15reps	~~Tricep~~ pushdown on cable system. 3.5 plates 2 x 15 reps

INTERVENTION

- Prehabilitation began with linear strengthening and balance.
- Additional core and rotational exercises were added once the patient showed good mechanics and control with linear movements. Rotational golf specific movements were chosen based on patient preference.
- Patient worked out 2-3x/week and was progressed based on response to exercises and 2 repetition rule.
- Post-Op focus was increasing ROM and strength using a similar approach to the prehabiliation program.

OUTCOMES

- Improved strength, decreased pain, increased standing tolerance prior to surgery.
- 6 PT visits prior to returning to personal training program.
- LEFS improvement beyond minimal detectable change of 9 points. 40 improved to 51 prior to surgery.
- Pt improved beyond baseline measures and returned to golfing without any pain.