Supplementary file S2

Treatment employed by the physiotherapists for the problems present in the n=22 participants

Problem (in order of treatment record)	**No of participants with problem**	**Treatment employed by the treating physiotherapist**	**n**	**Details added by physiotherapists relating to the treatment (direct quotes)**
Reduced functional mobility	12	Advice to gradually increase walking distance	12	Goal: be able to do 5 hour walk Already doing, encouraged to continue Walking 30 minutes currently; to increase as he feels able Regular short walks Speed up walking to make aerobic Advice to increase time walking and not worry about distance Progress walks from 3 per week to daily. Monitor stops during 2 mile walk Advised to slow down - build up of exercise gradually If no neurological pain as discussed in detail
		Advice re getting in and out of car	1	
		Walking activities	9	Restoration of normal walking pace to be monitored Discussion with patient - shoe raise as has altered gait due to leg length Walk regularly, especially on days when in meetings Gradually progress walking distance Regular short walks Discussed with patient - increase concentration on left foot position and foot control Treadmill Advised a day's hill walking up Scafell Pike is too much
		Stairs	2	28 stairs to flat. Does minimum 4 flights / day To aim for stairs with right leg leading
		Advice re how to manage foot drop	2	Tibialis anterior strengthening - no functional foot drop Monitor left mild foot drop
		Others	4	Encouraged use of exercise bike

				Return to gym, advice re bike, treadmill and stepper Calf strengthening Advice re gradual swimming and cycling
Reduced knowledge to enable self management	16	Explanation of healing, pain, recovery time, expectations of surgery	15	Particularly around disc dehydration and nerve root mobility Explained still healing at 6 weeks Nerve damage recovery 4 months. Soft tissue healing 4-8 weeks Can start to increase activity at 6 weeks eg. side plank Need to be careful between 6-12 weeks. Neural recovery 4 months Time scales to return to heavy work and gym work discussed Nerve recovery time scale, bone healing 12 weeks Explain healing time frame and limits to safe return Discussed in session 2 as reason for increased calf ache
		Discussion of aims and expectations of treatment	15	Discussed return to normal activities Explained healing and time lines Resolve leg pain and increase functional activity Restore muscle power to full power Monitor increase in fitness and return to activity Improve lumbar extension. Improve core. Improve condition / stamina for return to work Return to activity and normal work and gym To monitor residual symptoms. Assess and manage core stability Possibility for full/partial recovery discussed with patient
		Discuss any anxieties and explore any fear avoidance issues	12	Vigilant re employing correct movement habit Patient not moving into flexion at all due to fear avoidance Work place return and activity practise to decrease anxiety Nil, patient need to be discouraged from overdoing it Mild fear of lumbar flexion Main anxiety is "will I return to golf?" Advice return re gym Post traumatic stress disorder - patient keen to return to high level activity immediately as a coping strategy Discuss fear avoidance Fear of flexion instilled by preoperative emphasis on extension

		Goal setting	7	(1) Walk 5 hours, (2) walk normal pace (3) Do housework thoroughly Independent with home exercise programme, return to gym, improve gait return to low level, high repetitions weight lifting at 8 weeks Return to work by 12 weeks Attempt to set more realistic recovery goals Return to rowing, gentle cycling. At 10-12 weeks golf / mountain biking
		Reinforcing functional advice from manual e.g. specific advice on driving, milestones etc	7	No heavy lifting 12 weeks to moderate activity. No mountain biking until 12 weeks No heavy lifting etc Advice neutral spine in function Advice on 6 week / 12 week mile stones Advice on rowing position, sitting and forward lean posture
		Discuss increasing activity and to plan to return to work (or normal activities) as soon as able	13	Already returned to work Advice regarding occupational hazards No plan to return to work yet but phased return discussed Assess ability to lift weight after 6 weeks post op Discussed with patient who has already returned to work - requires increased driving and sitting Walking, lifting Plan to build activity and to assess lifting techniques approx 12 weeks Time scales and work handling discussed with patient Phased return to work Decrease activity to enable healing time, no heavy or intense training Returned to sedentary job on day 4 post surgery
		Discuss return to work plan and encourage patient to actively consider job/requirements +/- begin discussions with employer regarding graded return	7	Practise work physical tasks in physiotherapy session Discuss with employer need for breaks and regular position change Increase walking Patient to consider alternative job roles Discussed pacing
		Advice on general activities/ increasing other cardiovascular exercise e.g. gym, swim, cycle etc	15	Discussed gym - cross trainer, bike, gentle increase weights as comfortable Gentle increase in activity and light cardiovascular gym work Can freely increase aerobic work Static bike, increase walking, stairs

				Advice on swimming alternate days Cross trainer, cycle and swim to start Return to controlled gym work post 12 weeks Advice to add bike to gym Advice on gentle cardiovascular exercises
		Advice re smoking and bone healing	0	
		Tailored lifting advice	6	Lifting posture and technique with a work place hoist Lifting heavy blocks on return to work
		Tailored postural advice	10	Sitting - forward / backward lean using hip, sit to stand Maintaining stable thorax / pelvis relationship through movements Maintaining neutral spine / pelvis during sit to stand etc Sitting, sit to stand Talked through neutral spine Flat back posture Given ergonomic advice sheet, pacing, regular breaks Sitting posture, forward lean sitting from hip, arm reach, head position
		Others	2	Advice re gentle scar massage Advice re anti-inflammatories as prescribed, and activity modification
Reduced spinal range of movement	17	Accessory movements e.g. posterior-anterior (PA) technique	10	Grade III PA mobilisations central / unilateral x 3 x 30 seconds PA grade III x 30 seconds PA grade III L3-5 Grade IV PA mobilisations central and unilateral right L3-5 PA L1-3 grade III, PA in extension L1-3 grade III Mobilised right L4,5,S1 to decrease pain on hip extension PA L2 to improve extension but minimal benefit. Better at 2nd session. Grade III x 3 x 30 sec Central PA L4/5 grade III, PA grade III left side L4/5 x 1 min, L4 right and left, L3 right and left, combined left side flexion PA L4-5 PA left side grade III L1,2,3,4 facet x 1 minute each
		Physiological movements / mobility exercises in weight bearing	8	Stretches in standing Lumbar spine stretches in standing Seated and standing range of movement Gentle weight bearing range of movement

		Physiological movements in non weight bearing	8	Lumbar spine active range of movement stretches in crook lying Reviewed current exercises Seated range of movement Lumbar extension To assess lumbar spine vertebral movement Active range of movement exercises
		Others	2	Soft tissue techniques and trigger point pressure to left quadratus lumborum Palpation and sacral mobilisation to assess neural interface and re-test SLR
Reduced trunk stabilisation	20	Transversus abdominis in neutral	17	Pelvic Tilt Pelvic Tilt Concept gained via explanation of mechanism and pelvic tilt Corrected technique Trans Abdominus setting in crook lying - very poor Supine crook transverses abdominus, pilates 100s exercise Pelvic Tilt Pilates 100 setting Crook lying Transversus abdominus neutral
		Gluteal exercises	12	Concept gained via explanation of mechanism and pelvic tilt Reviewed current bridging technique Hip extension in prone knee bend Clam and bridge Prone kneeling right hip extension Bridging Piriformis release and patient taught self massage Piriformis stretch and endurance
		Progression of transversus abdominis	11	To do whilst walking at gym. Pilates exercises second treatment. 100s level 1 Decreased control on right leg crook needs addressing prior to lifting 100s and transverses abdominus in sitting Bridge - ball. Single leg bridge With leg slides

				Flexion biased Position well maintained, therefore core approach not planned
		Non-specific core stability exercises	9	Sitting forward / backward, stand from wall Bridging In standing, forward and backward lean sitting Bridging and review of patients own exercises Core contraction in standing and gym ball as finds crook lying difficult Bridging and global core exercises Excellent balance on perturbation
		Multifidus retraining	1	Squat work
		Advanced trunk stabilisation	4	Bridge to 1/2 range: overuses spinal extensors beyond this Advice on gym ball and gym work Right side plank with left hip abduction Bridging and increased gluteal control. Higher end core work
		Others	4	Trunk stabilisation in sitting, standing, sitting to standing and lifting Correction of spinal curve in side lying Advise on return to gym Importance of core re prevent recurrence
Reduced general strengthening	10	Lower limb strengthening exercises	9	Resisted plantar flexion with green theraband x 15 reps per day increase / decrease as able. Toe raises second treatment session Calf raise and tibialis anterior strengthening Right gluteal strengthening Sit to stand with left foot forward. Stair climbing. Static bike Squats Ankle dorsi flexion active assisted range of movement and strength Isometric calf holds. Calf raises appointment no 2 Gluteal exercises Exercise bike, rower
		Upper limb strengthening exercises	1	Advice re lifting weights in gym
		Others	1	Treatment 2 - did not commence side plank as patient reported mild right leg symptom post exercise. Encouraged hamstring stretch
	10	Specific cautious movements		SLR exacerbated pain for 4/7 at 1st assessment

Reduced neural mobility		SLR performed actively	4	Using hamstring stretch in supine - progressing popliteal angle SLR stretch with dorsi / plantar flexion x30 sec x 3 per day - not into painful range
		SLR performed passively	3	SLR mobilisations For assessment mild adverse neural tension right leg Decreased SLR due to neural tension
		Active slump	5	Sitting, left knee extension and dorsi flexion. Replace leg swing with this For adverse neural tension and hamstring length For mild adverse neural tension Use as a treatment to increase neural mobility Pelvic tilts to exercise lower lumbar spine range of movement
		Passive slump	1	With SLR for adverse neural tension
		Others	3	Sitting, leg swing, increasing reps and frequency if not exacerbating pain Heel and leg slides for gentle decrease adverse neural tension Piriformis release and stretches. Passive range of movement and SLR
Reduced conditioning / fitness	14	Graded functional exercises	8	Walking Advice on return to gym and cycling Discussed with patient staged return to sport and golf Bike and cross trainer 10% increase distance per week Advised to decrease activity to pace and manage pain and healing Cycling - start at 3/52
		Paced increase in activity	5	Walking, housework Increase gym activity gradually Walking 3rd session boom/bust activity Session 2 - to start rowing action, progressing exercises accordingly
		General aerobic exercises	8	Encouraged continue with cross trainer and bike in gym, increase gradually Advised to use cardiovascular exercise in gym - treadmill and static bike At treatment 1 already exercising aerobically 2 hours / day Walking, stairs and static bike Discussed with patient gym work Advice on static bike cycling for cardiovascular and neural mobility Exercise bike and stepper Rowing, cycling

		General strength training	2	Continue with gentle upper limb and lower limb weights in gym Discussed with patient gym work
		Low intensity exercises	0	
		High intensity exercises	1	Treatment 2 Encouraged continue with present programme for further week
		Others	3	Weight lifting starting low level Muscle energy technique hamstrings, discussed nature of osteoarthritis Muscle energy technique hamstrings
Reduced progress / plateau in improvement	4	Continue with exercises independently at home	2	Home exercise programme from hospital. Was performing bridge incorrectly
		Short and longer term goal setting	2	Improved strength and condition – return to work Increase walking
		Planning for the future	1	Pilates
		Others	0	
Pain	12	Explanation of pain physiology	5	Explanation of referred pain
		Advice on pain relief and who to contact	4	General Practitioner review and neuropathic pain agents discussed with patient Discussed with GP re wean from Gabapentin
		Advice re when to stop taking pain killers	3	On paracetamol only
		Advice re how to manage flare ups	0	
		Pain control interventions e.g. Acupuncture, TENS	1	Piriformis release and acupuncture
		Others	3	Advice that intermittent pain nothing to worry about and pain is soft tissue healing Advice sensory stimulus to decreased ankle area Advice regarding preventing recurrence
Impaired recovery owing to psychological factors	2	Cognitive behavioural approach	0	
		Pacing	2	Advice pacing in gym
		Goal setting	1	Little and often rather than boom bust
		Others	0	

Patient not responding / condition deteriorating / experiencing complications	1	Liaise with surgical team to discuss case	0	
		Liaison with surgical team / colleagues	0	
		Others	1	Liaise with consultant re return to work