UNIVERSIDADE FEDERAL DE CIÊNCIAS DA SAÚDE DE PORTO ALEGRE – UFCSPA

CURSO DE PÓS-GRADUAÇÃO EM CIÊNCIAS DA REABILITAÇÃO

Bruna de Moraes Lopes

EFEITOS DE PROTOCOLOS DE REABILITAÇÃO COM SUPERVISÃO PRESENCIAL OU DOMICILIAR NO PÓS-OPERATÓRIO RECENTE DE ARTROPLASTIA TOTAL DE QUADRIL: ENSAIO CLÍNICO RANDOMIZADO

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Tese submetida ao Programa de Pós-Graduação em Ciências da Reabilitação, da Universidade Federal de Ciências da Saúde de Porto Alegre como requisito para a obtenção do grau de Doutor.

Orientador: **Prof. Dr. Marcelo Faria Silva**

Porto Alegre, Novembro de 2020

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Porto Alegre
2020

Dedicatória

Essa tese é dedicada ao meu pai, José Mauro Ceratti Lopes (*in memoriam*).

AGRADECIMENTOS

Aos membros da banca por sua disponibilidade, por aceitarem acompanhar esse processo e contribuírem com seu conhecimento.

Aos pacientes que participaram dessa pesquisa como voluntários, por terem aceitado o nosso convite, por terem confiado em nosso trabalho, e pela resiliência, frente às dificuldades encontradas ao longo do caminho. Sua gratidão reforçam a sensação de que escolhemos o caminho certo.

Ao meu orientador, Marcelo Faria Silva, por todo o apoio e incentivo. Por servir de fonte de orientação (acadêmica, profissional e pessoal), incentivo e inspiração. Por ter uma dedicação incansável em prol da nossa profissão e nos contagiar (e por que não, às vezes, intimar) a partilhar com ele essa missão. Por ser uma pessoa acolhedora, com preocupações por seus alunos, que vão muito além do âmbito acadêmico. Por ter esse grande coração e fazer com que os alunos se sintam seguros ao seu lado. E por, depois de longos 8 anos de convivência e trabalho, ainda me aguentar.

Ao Bruno Manfredini Baroni, pelo auxílio prestado sempre que necessário, pelo profissionalismo e seriedade com que conduz seu trabalho.

Aos alunos bolsistas (voluntários e não voluntários) Camilla Rohde, Mateus de Col, Marina Corral, João Pedro Sartori e Ian Peroni (mesmo que por um período mais breve), bem como à colega fisioterapeuta Fernanda Fernandes pelo auxílio fundamental, pela disponibilidade, pelo interesse, por abraçarem esse projeto como se fosse de vocês e por cuidarem com carinho de todos nossos pacientes. Em especial: ao João pelos atendimentos prestados aos pacientes e por todo o divertimento; à Marina pela organização e seriedade com o banco de dados, e por ser o componente meigo desse grupo; à Camilla, pela troca infinita de mensagens de áudio, pela organização das coletas e pelo "*bullying*" mútuo; ao Mateus pelo entusiasmo com os treinamentos e pelos muitos questionamentos e dúvidas, sempre fazendo eu exercer meu lado professora. Obrigada por formarem o grupo do quadril comigo e torná-lo especial.

Aos serviços de ortopedia e traumatologia da Santa Casa de Misericórdia de Porto Alegre, do Hospital de Clínicas de Porto Alegre, do Hospital de Clínicas de Porto Alegre e do Hospital Cristo Redentor (Grupo Hospitalar Conceição). Em especial, aos médicos ortopedistas: Dr. Carlos Roberto Schwartsmann, Dr. Leandro Freitas Spinelli, Dr. Carlos Roberto Galia, Dr. Carlos Macedo e Dr. Ary da Silva Ungaretti Neto, juntamente com seus residentes e demais membros das equipes, pela receptividade e disponibilidade, permitindo a minha entrada nos ambulatórios e serviços, por encaminharem pacientes para essa pesquisa e por serem grandes .

Aos colegas do GEFITO, obrigada por estarem junto ao longo dessa caminhada, por fortalecerem nosso grupo e pela disponibilidade em auxiliar quando necessário.

Aos funcionários do laboratório de fisioterapia da UFCSPA, pela compreensão, cordialidade e empenho.

À minha mãe, Vivianni de Moraes Lopes, pelo amor, pelo carinho, pela segurança, pelo cuidado, por ser um porto Seguro, um exemplo de mãe e de resiliência.

Ao meu pai, José Mauro Ceratti Lopes, por ser um exemplo de pai, de professional e de professor. Por ter me mostrado a importância da dedicação, da perseverança, e me contagiado com seu gosto pelo estudo e pelo trabalho. Por ter marcado a vida de muitas pessoas e por ter deixado um legado.

À minha irmã, Paula de Moraes Lopes, pela construção das figuras utilizadas nesse trabalho, pelo apoio, pelos elogios, pelo divertimento, pela admiração mútua, por ser minha irmã mais velha que parece mais nova, por ser "a minha pessoa".

Ao meu esposo, Alexandre Noal dos Santos, pelo amor, pelo incentivo, pelo exemplo de dedicação ao trabalho e aos estudos, por mostrar que podemos vencer as adversidades e conquistar o que desejamos. Por me fazer rir, por me consolar nas horas tristes, pela companhia, por ser meu par.

E a todos os colegas, amigos e familiares que compreenderam as exigências desse momento e dessa trajetória, pois acreditaram nessa conquista.

RESUMO

A cirurgia de artroplastia total de quadril (ATQ) é o tratamento indicado para pacientes com doenças degenerativas da articulação do quadril que não apresentaram melhora com tratamentos conservadores. A reabilitação é um fator importante para evitar déficits em longo prazo e otimizar a recuperação funcional, porém a literatura ainda é controversa quanto aos tratamentos recomendados. Foram conduzidos dois estudos com pacientes em pós-operatório recente de ATQ: um estudo transversal, com objetivo de verificar correlações entre o *offset* femoral, vertical (OFV) e horizontal (OFH), e desfechos clínicos dos pacientes; e um ensaio clínico randomizado conduzido com o objetivo de comparar dois protocolos de exercícios na reabilitação de indivíduos em pós-operatório de ATQ, através de desfechos como: dor, cinesiofobia, amplitude de movimento (ADM), pico de torque isométrico (PT) e capacidade funcional (CF). 24 participantes foram randomizados em dois grupos: 14 no Grupo *Face-to-face* (GF), que realizava duas sessões semanais de exercícios com supervisão presencial; e 10 no Grupo Telerreabilitação (GT), que realizava exercícios em casa, com orientação de cartilha com fotografias e ligações semanais dos pesquisadores. Os dois protocolos tiveram duração de 6 semanas e os participantes foram avaliados em dois momentos: antes do início do protocolo (pré-intervenção) e em até sete dias do final dos treinamentos (pós-intervenção). Diferenças significativas ($p<0.05$) foram encontradas na ADM, PT e CF entre as avaliações pré e pós-intervenção. Não foram encontradas diferenças significativas ($p>0.05$) entre os grupos para as variáveis estudadas. Correlações moderadas foram encontradas entre: OFV e a ADM dos rotadores externos ($r=0.487$; $p=0.021$); OFH e PT dos rotadores externos ($r=-0.508$; $p=0.016$); e a diferença do OFV (membro operado e não operado) e a CF ($r=-0.570$; $p=0.006$). Podemos concluir, portanto, que ambos os protocolos foram capazes de promover melhora na ADM, PT e CF dos pacientes, e podem ser considerados alternativas de baixo custo e fácil aplicação na reabilitação inicial de pacientes com ATQ. Alterações no OF parecem influenciar a capacidade funcional, bem como a ADM e o PT dos rotadores externos do quadril.

Palavras-chave: osteoartrite; artroplastia de quadril; *offset* femoral; fisioterapia; reabilitação; força muscular.

ABSTRACT

Total hip arthroplasty (THA) surgery is the recommended treatment for patients with degenerative diseases of the hip joint that have not improved with conservative treatments. Rehabilitation is an important factor to avoid deficits in the long term and to optimize functional recovery, however the literature is still controversial as to the recommended treatments. Two studies were conducted with patients in recent postoperative period of THA: a cross-sectional study, with the objective of verifying correlations between the vertical (VFO) and horizontal (HFO) femoral offset and patients clinical outcomes; and a randomized clinical trial conducted with the aim of comparing two exercise protocols in the rehabilitation of individuals in post-operative THA, through outcomes such as: pain, kinesiophobia, range of motion (ROM), peak isometric torque (PT) and functional capacity (CF).24 participants were randomized into two groups: 14 in the Face-to-face Group (FG), which performed two weekly sessions of exercises with in person supervision; and 10 in the Telerehabilitation Group (TG), who carried out exercises at home, guided by a booklet with photographs and weekly calls from the researchers. The two protocols lasted 6 weeks and the participants were evaluated in two moments: before the beginning of the protocol (pre-intervention) and within seven days of the end of training (post-intervention). Significant differences ($p<0.05$) were found in ROM, PT and FC between the pre- and post-intervention assessments. No significant differences ($p>0.05$) were found between groups for the studied variables. Moderate correlations were found between: VFO and external rotators ROM ($r=0.487$; $p=0.021$); HFO and external rotators PT ($r=-0.508$; $p=0.016$); and the difference between VFO (operated and non-operated limb) and FC ($r=-0.570$; $p=0.006$). We conclude, therefore, that both protocols were able to promote improvement in ROM, PT and FC and can be considered low-cost and reproductible alternatives in the initial rehabilitation of post-THA patients. Changes in FO seem to influence FC, as well as hip external rotators ROM and PT.

Keywords: osteoarthritis; hip arthroplasty; femoral offset; physical therapy; rehabilitation; muscle strength.

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LISTA DE ABREVIATURAS E SIGLAS

ADM: Amplitude de Movimento

ATQ: Artroplastia Total de Quadril

END: Escala Numérica de Dor

GF: Grupo Face-to-Face

GT: Grupo Telerreabilitação

HHS: *Harris Hip Score*

IMC: Índice de Massa Corporal

MIO: Membro Inferior Operado

MINO: Membro Inferior Não-Operado

OA: Osteoartrite

OF: *Offset* Femoral

OFH: *Offset* Femoral Horizontal

OFV: *Offset* Femoral Vertical

OMS: Organização Mundial de Saúde

PT: Pico de Torque Muscular

TUG: *Timed Up and Go*

SUMÁRIO

1 INTRODUÇÃO

O quadril é uma das principais articulações acometidas pela osteoartrite (OA). Os pacientes apresentam como principais queixas a dificuldade de mobilidade e as restrições na realização de atividades funcionais de vida diária (subir e descer escadas, caminhar, dirigir e calçar sapatos).[1-3] O tratamento inicial da OA inclui uso de medicamentos analgésicos, uso de dispositivos auxiliares para marcha, fisioterapia e alterações no estilo de vida.[4]

Quando os métodos conservadores não foram capazes de alcançar resultados satisfatórios no alívio da dor e quando a capacidade para realizar as atividades de vida diária já estiver severamente comprometida, é feita a indicação de tratamento cirúrgico.[4,5] Dentre os tratamentos cirúrgicos disponíveis, o utilizado com maior frequência é a artroplastia total de quadril (ATQ).

O número de ATQs realizadas no mundo cresce anualmente. Entre 2003 e 2013, o número de ATQs realizadas na Austrália passou de 88 para 119, por 100.000 habitantes.[6] Nos Estados Unidos, o aumento entre 2000 e 2010, foi de 142 para 257 a cada 100.000 da população.[7] No ano de 2019 foram realizadas 13.540 cirurgias primárias de ATQ no Brasil, representando um custo de R$64.520.685,55 ao Sistema Único de Saúde (SUS).[8] Estima-se que, até o ano de 2046, o volume de ATQs realizadas no mundo terá aumentado em 219%.[9]

A ATQ consiste na substituição dos componentes femoral (cabeça do fêmur) e pélvico (acetábulo) da articulação coxofemoral, e tem como objetivos proporcionar alívio da dor, da imobilidade e da incapacidade, de modo que o paciente possa melhorar sua independência funcional.[10-12] Apesar dos objetivos propostos e dos altos índices de sucesso do procedimento (84-97%)[13], evidências apontam que indivíduos submetidos à cirurgia de ATQ podem persistir com restrições de movimento, déficits na força muscular e comprometimento funcional até 2 anos após a realização do procedimento.[14-20]

De acordo com a Okoro et al.[21], a reabilitação é um fator importante para evitar déficits em longo prazo e otimizar a recuperação funcional. A variação na metodologia dos estudos existentes, no que se refere aos tipos de intervenções, duração e frequência de aplicação do protocolo, bem como ao período de pós-operatório dos paciente, dificulta que conclusões em relação aos protocolos sejam obtidas em relação ao programa de reabilitação ideal.[21,22] Muitos protocolos de reabilitação descritos na literatura baseiam-se em exercícios funcionais de mobilização articular e fortalecimento muscular, sem incremento de carga externa[21,23-26], bem como em treino de marcha e/ou programas de caminhada[26,27], realizados no domicílio do paciente[24,25,28,29], ou em sessões presenciais, em clínicas[24,27,30-32].

O acesso ao cuidado de saúde pós-alta hospitalar pode ser difícil para os pacientes com ATQ, por razões que incluem: carência de vagas ou dificuldade de acesso a centros especializados, através do sistema público de saúde; limite no número de sessões de fisioterapia, pelos planos de saúde; e impossibilidade de arcar com os custos do tratamento e/ou do transporte.[22,28] A prescrição de exercícios domiciliares e monitorização à distância podem ser alternativas, acessíveis e de baixo-custo, para acompanhar e incentivar o processo de reabilitação desses pacientes.

Estudos demonstram que protocolos de exercícios domiciliares, supervisionados ou não, realizados no pós-operatório imediato ou tardio de pacientes com ATQ, apresentam bons resultados em relação à recuperação da força muscular, funcionalidade e velocidade da marcha.[26,28,33] Cabe ressaltar, entretanto, que tais estudos apresentam limitações metodológicas, uma vez que, mesmo tratando-se de ensaios clínicos randomizados, não apresentaram ocultação da alocação ou cegamento dos avaliadores.

A partir da contextualização teórica exposta, um amplo estudo foi realizado, tendo como resultado os artigos científicos apresentados nesta tese.

2 REVISÃO DE LITERATURA – CONTEXTUALIZAÇÃO

2.1 Articulação Coxofemoral

A articulação do quadril (coxofemoral) é descrita como do tipo bola e soquete. A bola é configurada pela cabeça (esférica) do fêmur, e o soquete (côncavo), pelo acetábulo da pelve, servindo como um conector entre o tronco e os membros inferiores.[34,35] O quadril apresenta as quatro características de uma articulação sinovial: cavidade articular, superfícies recobertas por cartilagem articular, membrana sinovial produzindo líquido sinovial, e cápsula ligamentar circundando as estruturas.[36]

O acetábulo está localizado no encontro entre os ossos da pelve: ílio, isquio e púbis. A profundidade dessa estrutura é aumentada pela presença de um lábrum fibrocartilaginoso, que promove estabilidade funcional para a articulação. O lábrum atua como um lacre entre o acetábulo e a cabeça femoral, impedindo o deslocamento de líquido do espaço intra-articular.[34]

A sustentação do quadril é realizada no interior do acetábulo por um extenso conjunto de tecidos conectivos e músculos. As forças que cruzam o quadril durante sua movimentação são atenuadas por espessas camadas de cartilagem articular, músculo e osso esponjoso do fêmur.[35]

Apesar da clássica descrição da articulação coxofemoral como bola e soquete com um único centro de rotação, o formato da cabeça femoral não é, de fato, perfeitamente arredondado. Desse modo, o centro de rotação da articulação não se mantém uniforme durante todos os graus de movimento e pode ser afetado por alterações morfológicas.[34]

O formato e a configuração do fêmur proximal têm implicações importantes sobre a congruência e a estabilidade da articulação, bem como sobre o estresse imposto às estruturas articulares. Duas angulações específicas do fêmur auxiliam a definir seu formato: o ângulo de inclinação e o ângulo de anteversão.[35] O ângulo de anteversão é mensurado pelo ângulo entre o eixo do colo do fêmur e os eixos dos côndilos femorais, correspondendo a uma leve rotação anterior do colo femoral no plano transverso. Os valores considerados normais para indivíduos adultos estão entre 12° e 14°.[34]

O ângulo de inclinação do fêmur proximal descreve o ângulo no plano frontal entre a cabeça femoral e o lado medial da diáfise femoral, sendo que o ângulo de inclinação considerado normal para um adulto é de, aproximadamente, 125º. Uma mudança no ângulo normal de inclinação é referida como coxa vara (menor do que 125º) ou coxa valga (maior do que 125º).[35]

A articulação do quadril possui três planos de movimento: sagital, onde ocorrem os movimentos de flexão e extensão; horizontal, onde são executados os movimentos de rotação medial e lateral; e frontal, onde são realizados os movimentos de abdução e adução. A biomecânica do quadril proporciona grande amplitude de movimentos, bem como movimentos rotacionais em todas as direções. Com isso, é necessária a atuação de diversos músculos, controlando a estabilidade dessa articulação.[36]

Os músculos que contribuem para a movimentação do quadril são numerosos e, juntos, permitem o posicionamento do tronco e do membro inferior um em relação ao outro.[34] A inervação dessa musculatura provém dos plexos lombar e sacral. Os nervos do plexo lombar inervam os músculos da coxa anterior e medial, enquanto os nervos do plexo sacral inervam os músculos do quadril lateral e posterior, da coxa posterior e de toda a perna.[35]

Os músculos do quadril podem contribuir para a realização de movimentos em diferentes planos, de acordo com a posição da articulação.[35] O ílio psoas, o reto femoral, o sartório e o tensor da fáscia lata são os principais responsáveis pela flexão do quadril. A extensão da articulação é realizada pela contração de glúteo máximo e isquiotibiais (bíceps femorais, semimembranoso e semitendinoso). As contrações dos músculos glúteo médio, glúteo mínimo e tensor da fáscia lata promovem a abdução e rotação interna da coxofemoral. A adução do quadril é realizada pela contração dos adutores magno, longo e curto. E a rotação externa da articulação é obtida através da ação de obturador interno, obturador externo, gêmeo superior, gêmeo inferior, piriforme e quadrado femoral.[34]

Alterações na anatomia articular produzem impacto sobre a biomecânica do quadril, uma vez que modificam a área de contato e capacidade de geração de força dos músculos.[35] Patologias que afetem a produção de força, controle ou distensão muscular, podem perturbar a fluidez, conforto e eficiência metabólica de diversos movimentos rotineiros, envolvidos em atividades funcionais ou recreativas.[35] Desempenhos anormais dos músculos do quadril provocam alteração na distribuição das forças na superfície articular, podendo predispor ao aparecimento de lesões degenerativas na cartilagem, osso ou tecidos conectivos circundantes. De acordo com o músculo afetado, alterações significativas podem ocorrer no alinhamento entre coluna lombar, pelve e fêmur.[35]

2.2 Osteoartrite de Quadril

A osteoartrite (OA) é considerada a doença musculoesquelética crônica mais comum no mundo, e foi definida pela Sociedade Brasileira de Reumatologia (2003) como uma afecção dolorosa das articulações que ocorre por insuficiência da cartilagem, ocasionada por um desequilíbrio entre a formação e a destruição dos seus principais elementos, dando origem a zonas de fibrilação e fissuração.[37]

A Organização Mundial de Saúde (OMS) estima que 9.6% dos homens e 18% das mulheres com idade acima de 60 anos sofre com essa doença, sendo que desses 80% apresentarão limitações de movimento e 25% estarão impossibilitados de realizar a maioria das atividades de vida diária.[1] A principal articulação acometida pela OA é o joelho, seguido do quadril, metacarpo falangeanas e interfalangianas.[38] Suas principais consequências são: dor, rigidez matinal, crepitação, redução de mobilidade, redução da força muscular, diminuição da estabilidade, deformidades articulares e redução da capacidade aeróbica.

Especificamente na OA do quadril, o sintoma mais comum é a dor mecânica localizada na região inguinal com frequente irradiação para o joelho.[4] Os pacientes podem apresentar restrições na execução de atividades funcionais (subir e descer escadas, caminhar e dirigir) e atividades domésticas (limpeza e jardinagem), podendo estar relacionadas à redução de força muscular, equilíbrio e mobilidade.[4] Em virtude dessas limitações, altos níveis de depressão e ansiedade podem ser encontrados nessa população.[39]

Evidências encontradas por Frosi et al.[2], apontam para a presença de diminuição de força em todos os grupos musculares que envolvem a articulação com OA, o que ocorre principalmente se as articulações acometidas forem responsáveis pela sustentação do peso corporal. Essa afirmação pode ser confirmada em estudo de Arokoski et al.[3], no qual a força muscular foi avaliada, de forma isométrica e isocinética, em indivíduos com OA unilateral de quadril, e observou-se uma redução entre 13-32% no membro acometido, em relação ao grupo controle.

O tratamento inicial da OA inclui uso de analgésicos, uso de dispositivos auxiliares para marcha, fisioterapia e alterações no estilo de vida. A indicação cirúrgica é feita quando os métodos conservadores não forem capazes de promover alívio da dor, e a capacidade para realização das atividades de vida diária já estiver severamente comprometida.[4,5] A determinação do tipo de procedimento cirúrgico depende, dentre outros fatores, da idade, da etiologia da doença, do nível de atividade do paciente, e da bilateralidade ou não da doença.[10] Dentre os procedimentos disponíveis, o mais frequentemente utilizado, é a artroplastia total de quadril (ATQ).[10]

2.3 Artroplastia Total de Quadril

A ATQ é uma das cirurgias ortopédicas realizadas com maior frequência, no mundo. No ano de 2019 foram realizadas 13.540 cirurgias primárias de ATQ no Brasil, representando um custo de R$64.520.685,55 ao sistema de saúde.[8] Estima-se que o volume de ATQs realizadas no ano de 2046, terá aumentado em 219%.[9]

A ATQ consiste na substituição dos componentes femoral (cabeça do fêmur) e pélvico (acetábulo) da articulação coxofemoral. Sua configuração moderna surgiu nos anos 60, quando *sir* John Charnley sugeriu a fixação de uma haste femoral com cabeça em aço inox. Com o passar dos anos a técnica cirúrgica e o material utilizados foram sendo aprimorados.[40]

Diferentes materiais encontram-se à disposição no mercado, tais como: polietileno, metais (aço inoxidável, titânio, cromo-cobalto etc.) e cerâmica. O modelo composto por metal articulado com superfície de polietileno permanece sendo o mais amplamente utilizado. Os desenhos dos modelos variam quanto ao tamanho da cabeça (22, 26, 28 ou 32mm), comprimento do colo (30-40mm), comprimento da haste femoral (12-18cm) e o *offset* femoral (38-45mm). Essas medidas devem ser levadas em consideração durante a escolha do modelo mais adequado para cada paciente.[10]

A fixação dos componentes protéticos pode ocorrer de forma cimentada ou não cimentada. A primeira permite descarga de peso precoce do membro operado, uma vez que o cimento apresenta 90% de sua polimerização nos primeiros 10 minutos após sua aplicação. A forma não cimentada consiste no uso de implantes porosos, nos quais a fixação se dá através do crescimento ósseo, que ocorre durante as primeiras seis semanas de pós-operatório.[41]

Segundo Sizínio[10], podemos dividir o acesso cirúrgico em: anterior, anterolateral, lateral, póstero-lateral e posterior. As principais abordagens utilizadas, todavia, são a anterolateral e a póstero-lateral. Na primeira, a articulação coxofemoral é abordada pelo espaço entre os músculos tensor da fáscia lata e glúteo médio. Na segunda, o acesso se dá através da separação do músculo glúteo máximo e liberação dos rotadores externos.[41]

Como toda cirurgia de grande porte, a ATQ apresenta riscos e possíveis complicações, como: tromboembolismo, considerado a mais comum; luxação, ocorrendo com maior frequência em até 6 semanas de pós-operatório, ou na presença de retroversão do componente acetabular e tensão inadequada de partes moles; lesões nervosas, estando relacionadas ao alongamento do membro inferior em virtude dos componentes protéticos, ao trauma intra ou pós-operatório, à extrusão de cimento e à luxação da prótese; fraturas periprotéticas, principalmente as fraturas de fêmur no transoperatório; lesão vascular (complicação rara); infecção, cuja incidência aumenta na presença de comorbidades como diabetes, obesidade e doenças autoimunes; afrouxamento asséptico; metalose e osteólise.[10]

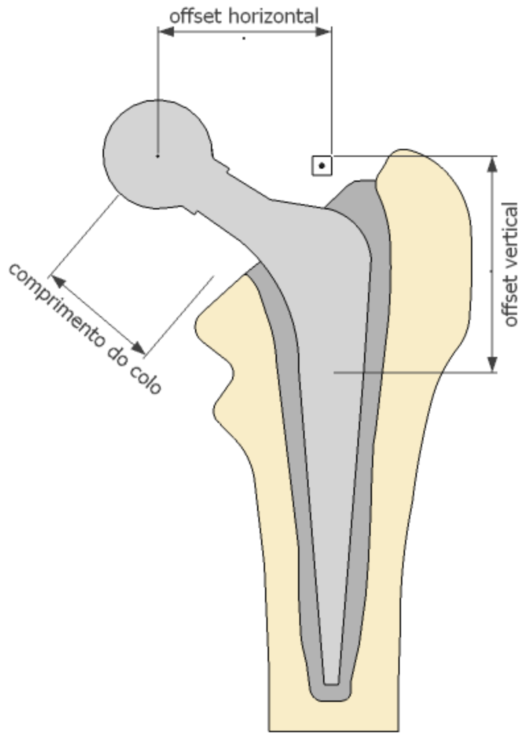
Para atingir altos níveis de sucesso faz-se extremamente importante, portanto, um planejamento adequado do procedimento cirúrgico, considerando principalmente a via de abordagem, o tamanho dos componentes protéticos e o cálculo do *offset* femoral.

2.3.1 *Offset* Femoral

Segundo Charnley[42] o *offset* femoral (OF) é considerado um fator sob o controle do cirúrgião, devendo ser levado em consideração tanto durante o planejamento cirúrgico, como para verificar o sucesso dos resultados pós-operatórios. O OF é normalmente mensurado à partir de exames de imagem (radiografia simples e/ou tomografia computadorizada) e pode ser dividido em OF vertical (OFV) e OF horizontal (OFH).[43-45]

O OFV é calculado pela distância entre duas linhas paralelas, uma passando no centro de rotação da cabeça femoral e, outra, no limite inferior das tuberosidades isquiáticas. O OFH é definido como a distância compreendida por uma linha passando perpendicularmente do centro de rotação da cabeça femoral até o ponto de encontro com outra linha que passa pelo eixo longo do fêmur. Segundo a literatura, a partir do cálculo da diferença entre os membros inferiores, podemos classificar o OFH em: aumentado, diferença de 5mm ou mais sendo o membro inferior operado (MIO) maior; reconstruído, diferença de até 5mm entre os membros; e reduzido, diferença menor que 5mm, sendo o MIO menor.[43-45]

Figura 1. Modelo para cálculo do offset femoral horizontal e vertical.



Fonte: elaborada pelo autor.

Evidências apontam para uma influência do OF em fatores biomecânicos do membro inferior, bem como na mobilidade e produção de força da musculatura do quadril. Diversos estudos[43,46-50] demonstram associações entre o OF e a produção de força muscular dos abdutores do quadril. Acredita-se que um OF maior (aumentado ou reconstruído) proporcionaria mais estabilidade dos componentes protéticos, melhora na tensão dos tecidos moles, na amplitude de movimento da articulação e na produção de força dos abdutores do quadril.[51] Em contrapartida, um OF reduzido estaria associado à discrepância de membros inferiores, piora da função do quadril e da marcha.[45]

Em estudo de Liebs et al.[52], foram encontradas correlações negativas entre o OF e a funcionalidade (questionário WOMAC), bem como níveis elevados de dor nos pacientes com OF aumentada. Os autores concluíram que um longo braço de alavanca, decorrente da reconstrução e/ou aumento do OF, poderia exacerbar a tensão dos músculos abdutores do quadril e do trato íliotibial, provocando dor e dificuldade de movimentação.

Um estudo biomecânico conduzido por Terrier et al.[53], demonstrou que o aumento do OF pode ser especialmente efetivo em pacientes com menor anteversão femoral, uma vez que proporcionaria à eles uma maior alavanca muscular. Cabe ressaltar, entretanto, que modificações no posicionamento dos componentes protéticos (medialização do componente acetabular e aumento excessivo do OF) poderiam facilitar a perda óssea e alterações proprioceptivas, em virtude do centro de rotação não-anatômico, levando à ampliação das forças de reação, influenciando assim, o tempo de duração da prótese.[54]

2.3.2 ATQ e limitações pós-operatórias:

A partir do alívio da dor e da imobilidade proporcionados pela cirurgia de ATQ, espera-se que os pacientes retornem às suas atividades de vida diária o mais breve possível.[11,12] Frequentemente, os pacientes mostram-se satisfeitos e relatam melhora na qualidade de vida durante os primeiros anos após a cirurgia.[19,55] Contudo, evidências apontam que os pacientes podem persistir, durante longos períodos, com incapacidades como: rigidez da articulação do quadril, fraqueza muscular e restrição na capacidade de realização de atividades funcionais.[20,32]

2.3.2.1. ATQ e amplitude de movimento articular:

No que se refere à rigidez da articulação do quadril é esperado que indivíduos submetidos a cirurgias de grande porte, como à ATQ, exibam redução de sua capacidade física no período pós-operatório imediato, apresentando maior imobilidade.[21] Evidências apontam, entretanto, que mesmo após 1 ano de pós-operatório os pacientes seguem com menor amplitude de movimento (ADM) no membro inferior operado, quando comparado ao membro inferior não-operado.[5]

Uma ADM preservada é extremamente importante para a execução de atividades de vida diária. Segundo Polkowski et al.[34] um indivíduo adulto típico necessita entre 67-124º de flexão de quadril, 18-33º de abdução de quadril e 15-26º de rotação externa do quadril para realizar tarefas como amarrar os cadarços (com o pé no chão ou em banco à frente), subir escadas, sentar e levantar de uma cadeira. Os sistemas disponíveis para avaliação da articulação do quadril costumam incluir, os seguintes domínios: atividades funcionais; dor; amplitude de movimento; presença ou ausência de deformidade; e achados radiográficos. A pontuação em cada sistema é obtida através da soma desses domínios, e a ADM representa entre 5-17% desse cálculo, variando conforme o sistema.[56] Desse modo, parece adequado que a ADM seja avaliada, também, de forma isolada, através de ferramentas específicas.

Diversos instrumentos encontram-se disponíveis no mercado para a avaliação da ADM, entretanto os que apresentam melhor custo benefício e aplicabilidade na prática clínica são: o goniômetro e o flexímetro. Apesar de menos usual, o flexímetro apresenta uma forte confiabilidade intra-avaliador (ICC=0.91-0.93; $p<0.001$), e uma excelente concordância com o goniômetro para mensuração da ADM do quadril (ICC=0.99; $p<0.001$).[57,58]

2.3.2.2 ATQ e força muscular:

No que se refere à força muscular estudos realizados em indivíduos em pós-operatório de ATQ sugerem que os músculos que atuam na articulação do quadril parecem ter uma recuperação mais lenta do que os músculos atuantes na articulação do joelho.[14,20,55] Corroborando com essas informações, Rasch et al.[14] observaram que, em um período de seis meses após a cirurgia de ATQ, os indivíduos haviam recuperado dois terços do *déficit* muscular dos extensores do joelho, e apenas um terço da força total da musculatura do quadril.

O trauma decorrente do procedimento cirúrgico foi sugerido como uma possível causa para o atraso na recuperação dos músculos do quadril. Entretanto, evidências apontam para a presença de alterações na morfologia muscular, como atrofia muscular e existência de material não contrátil (infiltrado gorduroso), nos músculos do membro inferior acometido, como possível causa para redução da capacidade de produção de força.[3,14,37,59]

Diferentes formas de mensuração e avaliação da força muscular encontram-se disponíveis, tais como: dinamômetro isocinético, dinamômetro portátil manual e teste de resistência manual.[60] O teste de resistência manual é amplamente utilizado na clínica, e consiste em uma técnica subjetiva que utiliza uma escala de pontuação entre 0-5 e não necessita de nenhum equipamento para sua aplicação, uma vez que a resistência é aplicada pelo avaliador. Esse teste, porém, apresenta menor precisão e maior chance de uma avaliação submáxima.[61]

O dinamômetro isocinético é considerado o padrão ouro para tal avaliação, uma vez que permite verificar diferentes variáveis musculares (pico de torque, velocidade, trabalho e potência muscular) de modo isocinético, nas contrações excêntricas, concêntricas e isométricas, com maior estabilização do paciente. Entretanto, o uso do dinamômetro isocinético pode acabar restrito à pesquisa, em virtude de seu alto custo e difícil manuseio.[61]

O dinamômetro isométrico portátil é de fácil uso e permite avaliação da força muscular, representada pelo pico de torque.[60] Para avaliação da musculatura do quadril de forma isométrica, o dinamômetro portátil demonstrou uma forte confiabilidade intra-avaliador (ICC=0.82-0.93; $p<0.05$) e uma concordância de moderada à boa (ICC=0.52-0.85; $p<0.05$), com o dinamômetro isocinético.[24] A literatura sugere que a avaliação isométrica poderia ser mais adequada para indivíduos idosos ou em período pós-operatório, tendo em vista a limitação de ADM e presença de dor.[60]

Dados referentes à força da musculatura do quadril (flexores, extensores e abdutores) de indivíduos com um ano de pós-operatório de ATQ, podem ser encontrados em estudo de Shih et al.[18], no qual a força muscular do membro inferior operado foi avaliada, de forma isométrica, através de um dinamômetro manual. Foram encontrados *déficits* no membro inferior operado entre 11% e 16% para os homens, e 19% e 21% para as mulheres, em comparação ao membro inferior não-operado. Entretanto, foram consideradas estatisticamente significativas, somente, as diferenças encontradas nos flexores de quadril ($p<0,05$). Frost et al.[19], também encontraram baixos picos de torque para esse grupo muscular, quando comparada a força muscular isométrica de idosos, submetidos à ATQ há 5 meses, com a de indivíduos de um grupo controle.

Evidências em relação à redução da força dos demais grupos musculares da articulação do quadril, também pode ser encontrada na literatura. Sicard-Rosenbaum et al.[20], evidenciou valores estatisticamente significativos indicando a fraqueza muscular de abdutores e extensores de quadril de pacientes com ATQ, quando comparados a um grupo controle. Alterações na força da musculatura do joelho podem estar presentes em indivíduos submetidos à ATQ, conforme demonstram achados da literatura, através da redução nos picos de torque do quadríceps observadas até um ano após o procedimento cirúrgico.[20,55]

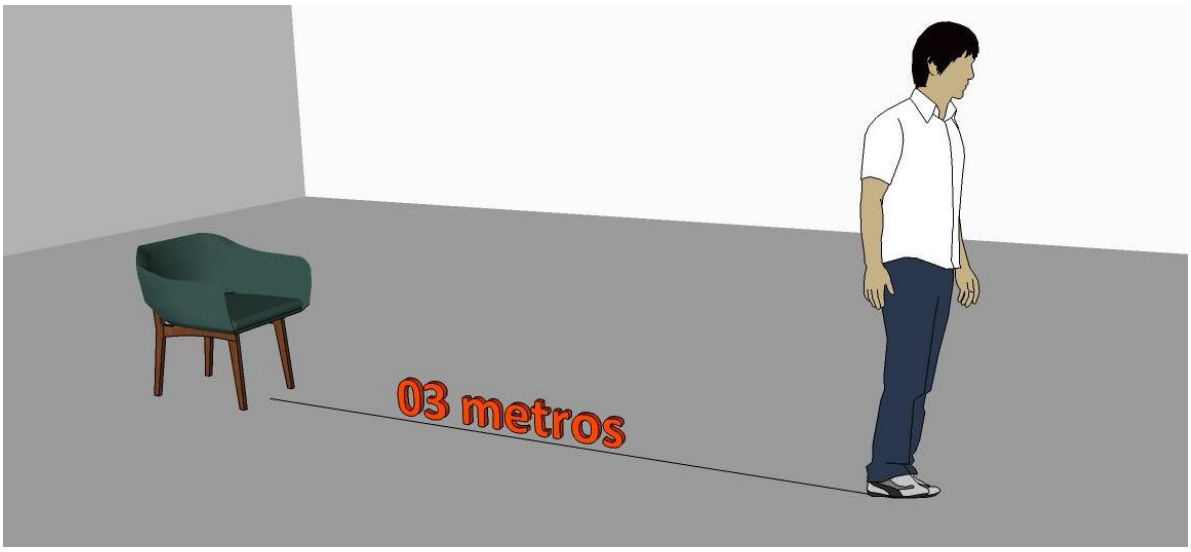
Evidências apontam para a participação da força muscular de membros inferiores na manutenção da estabilidade postural, controle de tronco e desempenho na marcha, variáveis relacionadas com o desempenho em atividades funcionais e à elevados riscos de queda.[62]

2.3.2.3 ATQ e Capacidade Funcional:

Em revisão sistemática com metanálise realizada por Vissers et al.[63], observou-se, a partir dos resultados de 31 estudos, que a recuperação da capacidade funcional dos pacientes submetidos à ATQ estava, em média, em 80% do que seria esperado para 6-8 meses de pós-operatório.

É possível avaliar a capacidade funcional desses indivíduos, através de ferramentas específicas, como o teste *Timed Up and Go* (TUG)[64] e o questionário *Harris Hip Score* (HHS).[65] O TUG é um teste clínico que apresenta boa confiabilidade inter e intra-examinadores.[64] Uma vez que este avalia movimentos utilizados no dia a dia, correlaciona-se bem com medidas de estabilidade postural, força muscular e habilidades funcionais em indivíduos idosos.[11] Para sua execução, o indivíduo deve sentar-se em uma cadeira sem apoio para os braços e com altura do assento de aproximadamente 46 cm, e, ao ser solicitado, deve levantar e percorrer uma distância de 3 m, em velocidade auto selecionada, até uma marca traçada no chão. O indivíduo deverá virar-se, voltar até a cadeira e se sentar. O tempo para a realização da tarefa é cronometrado pelo avaliador.[66,67]

Figura 2. Teste *"Timed Up and Go".*



Fonte: elaborada pelo autor.

De acordo com Bohannon et al.[68], indivíduos saudáveis com idade entre 60-69 anos, realizam o teste em aproximadamente 8.1 segundos e valores mais elevados devem ser esperados em faixas etárias maiores. Em estudo de Guedes et al.[11], foram comparados os valores obtidos (em segundos) para realização do TUG em um grupo de idosos com ATQ (tempo médio de pós-operatório de 2.6 ± 1.3 anos) aos de um grupo controle, com a mesma faixa etária. A média encontrada no grupo com ATQ foi de 14.67 segundos e, no grupo controle, foi de 10.08 segundos. Corroborando com esses resultados, nos estudos de Lavigne et al.[69] e Judd et al.[55], os indivíduos com ATQ apresentaram tempo maior na realização do teste TUG, chegando à uma diferença de até 11%, quando comparados ao grupo controle, mesmo em um período de 12 meses após a cirurgia. Segundo estudo de base populacional de Thrane et al.[70], a diferença de 2.4 segundos no tempo de realização do TUG é considerada clinicamente relevante. Os resultados dos estudos apresentados indicam, portanto, que os indivíduos com ATQ, não retornaram à funcionalidade considerada normal, mesmo após um longo período de pós-operatório.

O HHS[71] é um instrumento específico desenvolvido por Harris, idealizado para avaliar o estado funcional da articulação coxofemoral, sendo o mais frequentemente utilizado para avaliar os resultados pós-operatórios de ATQ.[72] É constituído de uma escala que varia de 0 a 100 pontos, e os domínios incluem dor, função, deformidade e amplitude de movimento (ADM). A pontuação total para o domínio dor é de 44 pontos e para o domínio função, de 47 pontos, sendo este último subdividido em atividades de vida diária (AVDs) e marcha com 14 e 33 pontos, respectivamente (Anexo I). Os escores desses domínios resultam das respostas dos sujeitos obtidas por meio de entrevista, já os domínios deformidade e ADM são avaliados pelo examinador com a utilização de fita métrica e goniômetro. Para o domínio deformidade, podem ser atribuídos até 4 pontos e, para o domínio ADM, até 5 pontos.[65]

O resultado funcional do HHS é classificado de acordo com a pontuação obtida, de modo que se considera: ruim, o escore menor que 70 pontos; regular, se for entre 70 e 79; bom, se a pontuação for entre 80 e 89 e, excelente, para o intervalo de 90 a 100 pontos. É um sistema de fácil aplicação, com comprovada reprodutibilidade, validado internacionalmente para pacientes com ATQ.[65] Segundo estudo de Singh et al.[72], alterações clinicamente relevantes envolvem diferenças no escore do HHS que variam no mínimo entre 15.9 –18 pontos.

2.3.2.4 ATQ, dor e cinesiofobia:

Dor e incapacidade funcional são os principais motivos que levam indivíduos com OA à realização da ATQ.[4,5] Segundo Castorina et al.[73], 50% dos pacientes submetidos à ATQ, descrevem a dor como uma das maiores preocupações a serem enfrentadas no pós-operatório. Entretanto, apenas uma pequena parcela dos pacientes apresenta queixas significativas de dor nesse período. Segundo a literatura a persistência de dor após o procedimento cirúrgico pode resultar de fatores psicológicos, como a interpretação do paciente e seu enfrentamento da dor, bem como sexo e massa corporal.[74]

Um modelo de medo-evitação foi proposto para explicar como a dor induz um prejuízo da auto-estima, levando ao medo do movimento, conhecido como cinesiofobia.[75] Atualmente, o termo cinesiofobia é utilizado para caracterizar um medo excessivo, irracional e debilitante do movimento e da atividade física, que resulta em sentimentos de vulnerabilidade frente à dor ou em medo de reincidência de lesão. A cinesiofobia provoca um ciclo de medo-dor-evitação que aumenta a percepção de incapacidade, podendo levar o paciente à síndrome do desuso.[76]

A Escala de Cinesiofobia de Tampa (Anexo II) é um dos principais instrumentos utilizados para avaliar a presença de cinesiofobia, sendo uma escala validada e confiável, com adequada consistência interna (α = 0,68-0,80), traduzida e adaptada no Brasil.[77] Ela consiste em um questionário auto-aplicável, composto de 17 questões que abordam a dor e intensidade dos sintomas. Os escores variam de um a quatro pontos, sendo que a resposta “discordo totalmente” equivale a um ponto, “discordo parcialmente”, a dois pontos, “concordo parcialmente”, a três pontos e “concordo totalmente”, a quatro pontos. Para obtenção do escore total final é necessária a inversão dos escores das questões 4, 8, 12 e 16. O escore final pode ser de, no mínimo, 17 e, no máximo, 68 pontos, sendo que, quanto maior a pontuação, maior o grau de cinesiofobia.[77]

Neblett et al.[78], propuseram uma classificação para o nível de cinesiofobia a partir do escore obtido na Escala de Cinesiofobia de Tampa, onde: pontuação entre 13-22 é considerada subclínica; entre 23-32, leve; entre 33-42, moderado; e, entre 43-52, severo. Segundo Monticone et al.[79], uma redução de, no mínimo, seis pontos no escore da Escala de Cinesiofobia de Tampa, pode ser considerado clinicamente relevante.

A cinesiofobia presente após a cirurgia parece estar relacionada: ao medo do paciente sentir dor durante a movimentação; à expectativa da cirurgia; e ao tamanho da ferida operatória.[75,80] Leeuw et al.[75], afirmam que a cinesiofobia afeta tanto a preparação, como a reabilitação da ATQ, levando à piores resultados pós-operatórios.

2.3.3 Reabilitação e ATQ

A reabilitação física é um componente essencial após a artroplastia de membro inferior.[81,82] Pacientes encaminhados à cirurgia de ATQ em decorrência de processos crônicos, tais quais OA e osteonecrose, costumam apresentar alterações como: sarcopenia, prejuízo da função neuromuscular; bem como desuso do membro inferior acometido, em virtude da dor.[21] Uma vez que os períodos de imobilização e redução do nível de atividade decorrentes de uma cirurgia de grande porte, como a ATQ, podem acentuar o declínio da massa muscular, bem como sua capacidade de produção de força, a reabilitação deve visar à melhora de desfechos funcionais, promovendo o retorno do paciente às suas atividades diárias.[21,81,82]

Atualmente, as intituições de saúde têm como prática fornecer atendimento fisioterapêutico logo após o procedimento cirúrgico, iniciando no mesmo dia da cirurgia ou no primeiro dia de pós-operatório, com continuidade durante o período de internação hospitalar. A maioria dos pacientes continua com alguma forma de acompanhamento após a alta hospitalar.[25]

Os programas de reabilitação descritos na literatura consistem em: mobilização da articulação[23-26], fortalecimento dos músculos circunjacentes com ou sem resistência[23-26], treino de marcha e/ou programas de caminhada.[26,27] Evidências sugerem que esses protocolos se mostram efetivos na redução da dor e melhora da mobilidade, entretanto, a literatura aponta que prejuízos na força muscular e na capacidade funcional podem ser encontrados em até um a dois anos após a cirurgia.[25] Parece válido, portanto, considerar o quão efetivos são os programas de reabilitação oferecidos após a alta hospitalar, no que se refere à restaurar a saúde física dos pacientes.[83]

Okoro et al.[21], conduziram uma pesquisa entrevistando fisioterapeutas do Reino Unido em relação ao que eles julgavam mais importante no tratamento de pacientes com ATQ e como conduziam o processo de reabilitação. Em relação à prescrição de exercícios, nenhum consenso foi encontrado. Eram priorizados exercícios com descarga de peso no membro operado (42%), exercícios funcionais (45%) e realizados na cama/maca (13%). Observou-se que os profissionais davam um maior enfoque aos músculos abdutores do quadril (62.2%) e quadríceps femoral (16.9%).[21] De modo geral, os protocolos utilizados pelos profissionais parecem sofrer grande influência de sua experiência clínica e das restrições impostas pelos cirurgiões, uma vez que a literatura carece de evidências para direcionar a reabilitação pós-alta hospitalar.[83]

É possível encontrar na literatura diversos estudos quanto à reabilitação de pacientes com ATQ, porém a variação entre a metodologia dos estudos dificulta que conclusões sejam obtidas em relação ao programa ideal.[22] Os estudos relatam diferenças acerca do: tipo de intervenção - alguns estudos apresentam programas de exercícios domiciliares (com ou sem acompanhamentos por visitas ou telefonemas) através de orientações e/ou cartilhas[24-26,31], enquanto outros trabalham com exercícios realizados com supervisão de um profissional[24,30-32]; duração do protocolo - os protocolos têm sua aplicação variando entre 4 semanas e 3 meses de duração;[83] frequência da intervenção – variando de duas vezes ao dia a duas vezes por semana[22]; período de pós-operatório - varia entre logo após a alta hospitalar ou em até três semanas de pós-operatório[29,32,84], variando até 12-24 meses de pós-operatório[24-26,30,33]; e grupo controle - em sua maioria os grupos controles recebem somente recomendações[27,84], realizam caminhadas[24] ou não recebem nenhuma intervenção[26,29], salvo aqueles que recebem intervenções com exercícios domiciliares, porém diferentes dos realizados pelo grupo presencial.[25,32]

A demanda e os custos da ATQ aumentaram significativamente na última década, e estima-se que sigam em crescimento nos próximos anos. Entretanto, os recursos com cuidados de saúde hospitalar e reabilitação pós-alta, estão cada vez mais restritos.[7,81] Os sistemas públicos de saúde carecem de centros especializados, os planos de saúde limitam o número de sessões de fisioterapia e nem todos os pacientes apresentam condições de pagar pelo tratamento de reabilitação.[85]

O acesso ao cuidado de saúde pós-alta hospitalar é difícil para muitos pacientes com ATQ, por razões que incluem: carência de vagas ou dificuldade de acesso à centros especializados, através do sistema público de saúde; limite no número de sessões de fisioterapia, pelos planos de saúde; e impossibilidade de arcar com os custos do tratamento e/ou do transporte.[22,28] Tais dificuldades fazem necessária a busca por alternativas a fim de acompanhar e incentivar o processo de reabilitação desses pacientes.

Dessa forma, a prescrição de exercícios domiciliares pode ser uma alternativa acessível e de baixo-custo, uma vez que não é necessário deslocamento e permite que um mesmo profissional acompanhe mais pacientes. Estudos demonstram que protocolos de exercícios domiciliares, supervisionados ou não, realizados no pós-operatório imediato ou tardio de pacientes com ATQ, apresentam bons resultados em relação à recuperação da força muscular, funcionalidade e velocidade da marcha.[26,28,33]

3 OBJETIVOS

3.1 Objetivos Gerais

Os objetivos primários dessa tese foram: comparar os efeitos de exercícios supervisionados presencialmente (*face-to-face*) à um programa de exercícios domiciliares (telerreabilitação), em relação à dor, amplitude de movimento, força muscular e funcionalidade, na reabilitação de pacientes submetidos à cirurgia de artroplastia total de quadril; e correlacionar critérios de análise ortopédica, a partir de exames de imagem, com desfechos clínicos.

3.2 Objetivos Específicos

De modo específico, os objetivos foram:

- Comparar o comprimento dos membros inferiores, pós-intervenção, do membro inferior operado e não operado;
- Comparar a intensidade dolorosa autorrelatada, pré e pós-intervenção, intra e entre grupos;
- Comparar a amplitude de movimento articular ativa do quadril, pré e pós-intervenção, intra e entre grupos;
- Comparar o pico de torque dos músculos do quadril, pré e pós-intervenção, intra e entre grupos;
- Comparar a capacidade funcional, pré e pós-intervenção, intra e entre grupos;
- Comparar a presença de cinesiofobia, pré e pós-intervenção, intra e entre grupos;
- Comparar o *offset* femoral, pós-intervenção, do membro inferior operado e não operado;
- Correlacionar o *offset* femoral, pós-intervenção, com o comprimento dos membros inferiores;
- Correlacionar o *offset* femoral, pós-intervenção, com a amplitude de movimento articular ativa do quadril;
- Correlacionar o *offset* femoral, pós-intervenção, com o pico de torque dos músculos do quadril;
- Correlacionar o *offset* femoral, pós-intervenção, com a capacidade funcional.

4 REFERÊNCIAS

1. WHO. World Health Organization. Disponível em: http://www.who.int/chp/topics/rheumatic/en/. Acesso em 28 de Junho de 2020.
2. Frosi G, Sulli A, Testa M, Cutolo M. Physiopathology and biomechanics of hip osteoarthritis. Rheumatismos. 2001;53(4):271-9.
3. Arokoski MH, Arokoski JPA, Haara M, Kankaanpää M, Vesterinen M, Niemitukia LH et al. Hip muscle strength and muscle cross sectional area in men with and without hip osteoarthritis. The Journal of Rheumatology. 2002;29(10):2185-95.
4. Szymanski C, Thouvarecqe R, Dujardinb F, Migaudd H, Maynoua C, Girardc J. Functional performance after hip resurfacing or total hip replacement: a comparative assessment with non-operated subjects. Orthopaedics & Traumatology: Surgery & Research. 2012;98:1-7.
5. Gadia JA, Marques AP, Miranda FG. Avaliação da dor, capacidade funcional e amplitude articular em pacientes submetidos a artroplastia total de quadril. Acta Ortop Bras. 1999;7(4):159-66.
6. Wolford ML, Palso K, Bercovitz A. Hospitalization for total hip replacement among inpatients aged 45 and over: United States, 2000–2010. NCHS data brief, no 186. Hyattsville, MD: National Center for Health Statistics. 2015.
7. Kurtz S, Ong K, Lau E, Mowat F, Halpern M. Projections of primary and revision hip and knee arthroplasty in the United States from 2005 to 2030. J Bone Joint Surg. 2007; 89:780-5.
8. DATASUS. Disponível em: https://datasus.saude.gov.br/. Acesso em 29 de Junho de 2020.
9. Ongo JR, Onggo JD, Steiger R, Hau R. The Efficacy and safety of inpatient rehabilitation compared with home discharge after hip or knee arthroplasty: a meta-analysis and systematic review. The Journal of Arthroplasty. 2019; 34:1823-30.
10. Sizínio H. Ortopedia e Traumatologia: princípios e prática. 4ª ed. Porto Alegre: Artmed; 2009.
11. Guedes RC, Dias J, Dias RC, Borges VS, Lustosa LP, Rosa NM. Artroplastia total de quadril em idosos: impacto na funcionalidade. Rev Bras Fisioter. 2011;15(2):123-30.

12. Tanaka R, Shigematsu M, Motooka T, Mawatari M, Hotokebuchi T. Factors Influencing the Improvement of Gait Ability After Total Hip Arthroplasty. The Journal of Arthroplasty. 2010; 25(6):982-5.
13. Shan L, Shan B, Graham D, Saxena A. Total hip replacement: a systematic review and meta-analysis on mid-term quality of life. Osteoarthristis and Cartilage. 2014; 22(3):389-406.
14. Rasch A, Dalén N, Berg HE. Muscle strength, gait, and balance in 20 patients with hip osteoarthritis followed for 2 years after total hip arthroplasty. Acta Orthopedica. 2010; 81(2):183-8.
15. Knox M. Outcomes of total hip arthroplasty: a study of patients one-year postsurgery. J Orthop Sporsts Phys Ther. 2002; 32(9):469-70.
16. Nallegowda M, Singh U, Bhan S, Wadhwa S, Handa G, Dwivedi SN. Balance and Gait in Total Hip Arthroplasty. Am J Phys Med Rehabil. 2003; 82(9):669-77.
17. Majewski M, Bischoff-Ferrari HA, Gruneberg C, Dick W, Allum J. Improvements in balance after total hip replacement. J Bone Joint Surg. 2005; 87-B(10):1337-43.
18. Shih CH, Du YK, Lin YH, Wu CC. Muscular recovery around the hip joint after total hip arthroplasty. Clin Orthop Relat Res. 1994; 115–20.
19. Frost KL, Bertocci GE, Wassinger C, Munin MC, Burdett RG, Fitzgerald SG. Isometric performance following total hip arthroplasty and rehabilitation. J Rehabil Res Dev. 2006; 43(4):435-44.
20. Sicard-Rosenbaum L, Light KE, Behrman AL. Gait, lower extremity strength, and self-assessed mobility after hip arthroplasty. Journal of Gerontology. 2002; 57(1):47–51.
21. Okoro T, Ramavath A, Howarth J, Jenkinson J, Maddison P, Andrew JG et al. What does standard rehabilitation practice after total hip replacement in the UK entail? Results of a mixed methods study. BMC Musculoskelet Disord. 2013; 14(1):91.
22. Nelson M, Bourke M, Crossley K, Russell T. Telerehabilitation is non-inferior to usual care following total hip replacement: a randomized controlled non-inferiority trial. Physiotherapy. 2019; 107:19-27.
23. Suetta C, Aagaard P, Rosted A, Jakobsen AK, Duus B, Kjaer M et al. Training-induced changes in muscle CSA, muscle strength, EMG, and rate of force

development in elderly subjects after long-term unilateral disuse. J Appl Physiol. 2004; 97(5):1954-61.

24. Unlu E, Eksioglu E, Aydog E, Aydoth ST, Atay G. The effect of exercise on hip muscle strength, gait speed and cadence in patients with total hip arthroplasty: a randomized controlled study. Clin Rehabil. 2007; 21(8):706–11.
25. Trudelle-Jackson E, Ermeson R, Smith S. Outcomes of Total Hip Arthroplasty: A Study of Patients One Year Postsurgery. J Orthop Sports Phys Ther. 2002; 32(6):260-7.
26. Jan MH, Hung JY, Lion JCH, Wang SF, Liu TK, Tang PF. Effects of a home program on strength, walking speed, and function after total hip replacement. Arch Phys Med Rehabil. 2004; 85:1943-51.
27. Wang AW, Gilbey HJ, Ackland TR. Perioperative exercise programs improve early return of ambulatory function after total hip arthroplasty: a randomized, controlled trial. Am J Phys Med Rehabil. 2002; 81(11):801–6.
28. Galea M, Levinger P, Lythgo N, Cimoli C, Weller R, Tully E et al. Targeted home- and center-based exercise program for people after total hip replacement: a randomized clinical trial. Archives of Physical Medicine & Rehabilitation. 2008; 89:1442-47.
29. Lowe CJM, Barker KL, Dewey ME, Sackley CM. Effectiveness of physiotherapy exercise following hip arthroplasty for osteoarthritis : a systematic review of clinical trials. BMC Musculoskelet Disord. 2009; 14:1–14.
30. Monaghan B, Grant T, Hing W, Cusack T. Functional exercise after total hip replacement (FEATHER): a randomised control trial. BMC Musculoskelet Disord. 2012; 13(1):237
31. Skoffer B, Dalgas U, Mechlenburg I. Progressive resistance training before and after total hip and knee arthroplasty: a systematic review. Clinical Rehabilitation. 2015; 29(1):14–29.
32. Husby VS, Helgerud J, Bjørgen S, Husby OS, Benum P, Hoff J. Early maximal strength training is an efficient treatment for patients operated with total hip arthroplasty. Arch Phys Med Rehabil. 2009; 90(10):1658–67.
33. Sashika H, Matsuba Y, Watanabe Y. Home program of physical therapy: effect on disabilities of patients with total hip arthroplasty. Arch Phys Med Rehabil. 1996; 77(3):273-277.

34. Polkowski GG, Clohisy JC. Hip Biomechanics. Sports Medicine and Arthroscopy Review. 2010; 18:56-62.
35. Neumann DA. Kinesiology of the hip – a focus on muscular actions. Journal of Orthopaedics & Sports Physical Therapy. 2010; 40(2):82-94.
36. Byrne D, Mulhall KJ, Baker JF. Anatomy & biomechanics of the hip. The Open Sports Medicine Journal. 2010; 4:51-57.
37. Holstege MS, Lindeboom R, Lucas C. Preoperative quadriceps strength as a predictor for short-term functional outcome after total hip replacement. Arch Phys Med Rehabil. 2011; 92(2):236–41.
38. Gur H, Çakin N. Muscles mass, isokinetic torque, and functional capacity in women with osteoarthritis of the knee. Arch Phys Med Rehabil. 2003; 84:1534-41.
39. Pua Y, Wrigley T, Cowan SM, Bennell KL. Intrarater test-retest reliability of hip range of motion and hip muscle strength measurements in persons with hip osteoarthritis. Arch Phys Med Rehabil. 2008; 89:1146-51.
40. Macedo CAS, Galia CR, Rosito R, Perea CEF, Müller LM, Verzoni GG et al. Abordagem cirúrgica na artroplastia total primária de quadril: ântero-lateral ou posterior? Revista Brasileira de Ortopedia. 2002; 37(9):387-91.
41. Dutton M. Fisioterapia ortopédica: exame, avaliação e intervenção. 2ª ed. Porto Alegre: Artmed; 2010.
42. Charnley J. Low friction arthroplasty of the hip. Nova York: Springer; 1979.
43. Chamnongkich S, Asayama I, Kinsey TL, Mahoney OM, Simpson KJ. Difference in hip prosthesis femoral offset affects hip abductor strength and gait characteristics during obstacle crossing. Orthopedic Clinics of North America. 2012; 43:e48-e58.
44. Clement ND, Patrick-Patel RS, MacDonald D, Breusch SJ. Total hip replacement: increasing femoral offset improves functional outcome. Arch Orthop Trauma Surg. 2016; 136:1317-23.
45. Sato H, Maezawa K, Gomi M, Kajihara H, Hayashi A, Maruyama Y et al. Effect of femoral offset and limb length discrepancy on hip joint muscle strength and gait trajectory after total hip arthroplasty. Gait & Posture 2020; 77:276-82.
46. Asayama I, Naito M, Fujisawa M, Kambe T. Relationship between radiographic measurements of reconstructed hip joint position and the Trendelenburg sign. Journal of Arthroplasty. 2002; 17:747-51.

47. Asayama I, Chamnonkich S, Simpson K. Reconstructed hip joint position and abductor muscle strength after total hip arthroplasty. Journal of Arthroplasty. 2005; 20(4):414-20.
48. Yamaguchi T, Naito M, Asayama I, Ishiko T. Total hip arthroplasty: the relationship between posterolateral reconstruction, abductor muscle strength, and femoral offset. Journal of Orthopaedic Surgery and Research. 2004; 12(2):164-7.
49. Mahmood SS, Mukka SS, Crnalic S, Wretenberg P, Sayed-Noord AS. Association between changes in global femoral offset after total hip arthroplasty and function, quality of life, and abductor muscle strength. Acta Orthopaedica. 2016; 87(1):36-4.
50. Tezuka T, Inaba Y, Kobayashi N, Ike H, Kubota S, Kawamura M. Effects of hip joint center location and femoral offset on abductor muscle strength after total hip arthroplasty. Modern Rheumatology. 2015; 25(4):630-6.
51. Miashiro EH, Fukili EN, Yamaguchi EN, Chikude T, Rodrigues LHS, Fontes GM et al. Planejamento pré-operatório de artroplastias totais primárias de quadril com o uso de radiografias convencionais. Revista Brasileira de Ortopedia. 2014; 49(2):140-8.
52. Liebs TR, Nasser L, Herzberg W, Rüther W, Hassenpflug J. The influence of femoral offset on health-related quality of life after total hip replacement. Bone Joint Journal. 2014; 96-B:36-42.
53. Terrier A, Levrero FF, Rudiger HA. Benefit of cup medialization in total hip arthroplasty is associated with femoral anatomy. Clinical Orthopaedic Related Research. 2014; 472:3159-65.
54. Little NJ, Busch CA, Gallagher JA, Rorabeck CH, Bourne RB. Acetabular polyethylene wear and acetabular inclination and femoral offset. Clinical Orthopaedic Related Research. 2009; 467:2895-900.
55. Judd DL, Dennis DA, Thomas AC, Wolfe P, Dayton MR, Stevens-Lapsley JE. Muscle Strength and Functional Recovery During the First Year After THA. Clin Orthop Relat Res. 2014; 472:654–64.
56. Davis KE, Ritter MA, Berend ME, Meding JB. The importance of range of motion after total hip arthroplasty. Clinical Orthopaedics and Relates Research. 2007; 465:180-4.

57. Gouveia VH, Araújo AGF, Maciel SS, Ferreira JJA, Santos HH. Reliability of the measures inter and intra-evaluators with universal goniometer and fleximeter. Fisioterapia & Pesquisa. 2014; 21:229-35.
58. Pires-Oliveira AA, Freitas RQ, Júnior AA, Oliveira LC, Oliveira RG, Olveira-Silva I et al. Analysis of agreement of assessment tools of range of motion in the elderly. Manual Therapy, Posturology & Rehabilitation Journal. 2018; 16:538-43.
59. Loureiro A, Mills PT, Barrett RS. Muscle weakness in hip osteoarthritis – a systematic review. Arthritis Care & Research. 2013; 65(3):340-52.
60. Arnold CM, Warkentin KD, Chilibeck PD, Magnus CRA. The reliability and validity of handheld dynamometry for measurement of lower-extremitiy muscle strength in older adults. Journal of Strength and Conditioning Research. 2010; 23(3):815-24.
61. Scott DA, Bond EQ, Sisto SA, Nadler SF. The intra and interrater reliability of hip muscle strength assessment usgin a handheld versus a portable dynamometer anchoring station. Arch Phys Med Rehabil. 2004; 85:598-603.
62. Loizeau J, Allard P, Duhaime M, Landjerit B. Bilateral gait patterns in subjects fitted with a total hip prosthesis. Arch Phys Med Rehabil. 1995; 76:552-557.
63. Vissers MM, Bussmann JB, Verhaar JAN, Arends LR, Furlan AD, Reijman M. Recovery of physical functioning after total hip arthroplasty – systematic review and meta-analysis of the literature. Physical Therapy. 2011; 91:615-629.
64. Mathias S, Nayak US, Isaacs B. Balance in elderly patients: The “Get-up and Go” test. Archives of Physical Medicine and Rehabilitation. 1986; 67:387-9.
65. Patrizzi LJ, Vilaça KHC, Takata ET, Trigueiro G. Análise Pré e Pós-Operatória da Capacidade Funcional e Qualidade de Vida de Pacientes Portadores de Osteoartrose de Quadril Submetidos à Artroplastia Total. Revista Brasileira de Reumatologia. 2004; 44:185-91.
66. Blyth FM, March LM, Brnabic AJ, Cousins MJ. Chronic pain and frequent use of health care. Pain. 2004; 111:51-8.
67. Bookwala J, Harralson T, Parmelee P. Efects of pain on functioning and well-being in older adults with osteoarthritis of the knee. Psychology and Aging. 2003; 18:844-50.
68. Bohannon RW. Reference values for the timed up and go test: a descriptive meta-analysis. J Geriatr Phys Ther. 2006; 29(2):64-8.

69. Lavigne M, Therrien M, Nantel J, Roy A, Prince F, Vendittoli P. The functional outcome of hip resurfacing and large-head THA is the same. Clin Orthop Relat Red. 2010; 468:326-336.
70. Thrane G, Joakimsen RM, Thornquist E. The association between timed up and go test and history of falls: The Tromso study. BioMed Central Geriatrics. 2007; 12:7-1.
71. Guimarães R, Alves DPL, Silva GB, Bittar ST, Ono NK, Honda E et al. Translation and cultural adaptation of the Harris Hip Score into portuguese. Acta Ortopédica Brasileira. 2010; 18:142-47.
72. Singh JA, Schleck C, Harmsen S, Lewallen D. Clinically importante improvement thresholds for HHS and its ability to predict revision risk after primary THA. BMC Musculoskeletal Dirsorders. 2016; 17:256.
73. Castorina S, Guglielmino C, Castrogiovanni P, Szychlinska MA, Ioppolo F, Massimino P et al. Clinical evidence of traditional vs fast track recovery methodologies after total arthroplasty for osteoarthritic knee treatment: a retrospective observational study. Muscles, Ligaments and Tendons Journal. 2017; 7(3):504-13.
74. Burns LC, Ritvo SE, Ferguson MK, Clarke H, Seltzer Z, Katz J. Pain catastrophizing as a risk factor for chronic pain after total knee arthroplasty: a systematic review. *Journal of Pain Research*. 2015; 8:21-3.
75. Leeuw M, Goossens MEJB, Linton SJ, Crombez G, Boersma K, Vlayen JWS. The fear-avoidance model of musculoskeletal pain: current state of scientific evidence. Journal of Behavioral Medicine. 2007; 30(1):77-94.
76. Güney-Deniz H, Kinikli GI, Çaglar Ö, Atilla B, Yüksel I. Does kinesiophobia affect the early functional outcomes following total knee arthroplasty? Physiotherapy Theory and Practice. 2017; 33(6): 448-53.
77. Siqueira FB, Teixeira-Salmela LF, Magalhães LC. Analysis of the psychometric properties of the brazilian version of the tampa scale of kinesiophobia. Acta Ortop Bras. 2007; 15(1):19-24.
78. Neblett R, Hartzell MM, Bradford EM, Gatchel RJ. Establishing clinically meaningful severity levels for the Tampa Scale for Kinesiophobia (TSK-13). European Journal of Pain. 2016; 20(5): 701-10.
79. Monticone M, Ambrosini E, Rocca B, Foti C, Ferrante S. Responsiveness and minimal clinically important changes for the Tampa Scale of Kinesiophobia after

lumbar fusion during cognitive behavioral rehabilitation. European Journal of Physical and Rehabilitation Medicine. 2017; 53(3):351-8.

80. Sullivan M, Tanzer M, Reardon G, Amirault D, Dunbar M, Stanish W. The role of presurgical expectancies in predicting pain and function one year following total knee arthroplasty. Pain. 2011; 152:2287-93.
81. Jansson MM, Rantala A, Miettunen J, Puhto AP, Pikkarainen M. The effects and safety of telerehabilitation in patients with lower-limb joint replacement: a systematic review and narrative synthesis. Journal of Telemedicine and Telecare. 2020; 0(0):1-9.
82. Bandholm T, Wainwright TW, Kehlet H. Rehabilitation strategies for optimisation of functional recovery after major joint replacement. J Expert Orthop. 2018; 5:44.
83. Coulter CL, Scarvell JM, Neeman TM, Smith PN. Physiotherapist-directed rehabilitation exercises in the outpatient or home setting improve strength, gait speed and cadence after elective total hip replacement: a systematic review. Journal of Physiotherapy. 2013; 59:219-26.
84. Gilbey HJ, Ackland TR, Wang AW, Morton AR, Trouchet T, Tapper J. Exercise improves early functional recovery after total hip arthroplasty. Clinical Orthopaedics and Related Research. 2003; 408:193-200.
85. Bettger JP, Green CL, Holmes DN, Chokshi A, Mather RC, Hoch BT et al. Effects of virtual exercise rehabilitation in-home therapy compared with traditional care after total knee arthroplasty. J Bone Joint Surg Am. 2019; 00(00):1-9.

5 ARTIGOS

5.1 ARTIGO 1

Submetido à revista "Brazilian Journal of Physical Therapy" – Ed. Física: A2; FI: 2.1

INFLUENCE OF FEMORAL OFFSET ON THE FUNCTIONAL OUTCOME OF PATIENTS WITH TOTAL HIP ARTHROPLASTY: A CROSS-SECTIONAL STUDY.

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ABSTRACT

Objective: to correlate vertical (VFO) and horizontal (HFO) femoral offset with hip range of motion (ROM), peak muscle torque (PT), functional capacity and lower limb length in patients with total hip arthroplasty (THA).

Methods: cross-sectional, case control study (level of evidence III), 22 individuals (10 men and 12 women), aged 61 (41-72) and within 23 (10-40) postoperative days, were evaluated for: active hip ROM (fleximetry); Isometric PT (portable dynamometer); functional capacity - Timed up and Go test (TUG) and Harris Hip Score questionnaire; lower limb length (measuring tape); and VFO and HFO from radiographs.

Results: the operated limb showed a reduction in CM ($p=0.006$), abduction ($p=0.001$), flexion ($p=0.003$) and external rotation ($p=0.003$) ROM, and in all PT ($p<0.05$) in comparison to the contralateral limb. Moderate correlations between: VFO and external rotators ($r=0.487$; $p=0.021$); HFO and external rotators PT ($r=-0.508$; $p=0.016$); and the difference between the VFO (operated and non-operated limb) and the TUG ($r=-0.570$; $p=0.006$).

Conclusion: changes in the FO seem to influence the functional capacity, as well as the movement and hip external rotators PT in patients with THA considering the postoperative period evaluated.

Keywords: total hip arthroplasty; femoral offset; muscle strength; functional capacity.

INTRODUCTION

Total hip arthroplasty (THA) consists in the surgical replacement of the femoral (femoral head) and pelvic (acetabulum) components of the hip joint.[1] The number of

THA performed in the world has been growing annually, it is estimated a 219% worldwide increase in the number of THA performed until the year 2046, representing a higher cost to the health system.[2] Preoperative planning is essential for the proper choice of prosthetic components, aiming to restore the biomechanics of the hip to normal conditions.[3]

The measurements of the vertical (VFO) and horizontal (HFO) femoral offset can be considered both in surgical planning and in the verification of postoperative results. Previous studies have shown positive associations between femoral offset (FO) and hip abductors muscle strength.[4-10] A more lateral position of the femur followed by a greater offset could provide a biomechanical advantage, associated with greater stability of prosthetic components. It is believed that this positioning would allow a better range of motion (ROM) and strength production by the hip abductors, as well as an improvement in the tension of soft tissues.[11] However, more studies are needed to verify the possible relationships between the radiographic variables and the clinical outcomes.

Thus, the objectives of this study were to correlate the findings of FO with those of hip ROM, hip muscle peak torque, lower limb length and functional capacity in patients submitted to primary THA surgery.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted with patients submitted to primary THA surgery in hospitals in Porto Alegre (RS, Brazil). Prior to data collection, the written informed consent was obtained from all participants. This study was approved by the Federal University of Health Science Research Ethics Committee (protocol 3.049.371) and a registered in Clinical Trials (NCT3208829) as part of a larger study.

Participants

Individuals with postoperative complications (infections, deep vein thrombosis, prosthesis dislocation, periprosthetic fractures and neural injuries), THA surgery on the contralateral limb less than a year prior to this study, and other orthopedic surgeries on the lower limbs were excluded from the study. All surgeries were performed with a posterior hip approach.

Outcomes

Participants attended a single evaluation session with the same experienced and trained assessor, between 10 to 40 days after surgery. In this evaluation, data regarding age, body mass index (BMI), lower limb length (LLL), hip ROM, hip muscle PT and functional capacity were obtained. The LLL was measured using a tape measure, considering the antero-superior iliac spine and the medial malleolus as anatomical points, with the patients in the supine position with extended lower limbs.

Range of Motion

Active ROM was assessed bilaterally using a fleximeter (model FL6010, Sanny, Brazil). Participants were instructed to perform each movement twice and were interrupted if compensatory movements (pelvis or trunk) were observed. The positions used can be seen in Figure 1.[12]

Peak Muscle Torque

Hip muscle PT was measured bilaterally, using a portable dynamometer (Micro-Fet II model, Hoggan Health Industries). Three measurements of maximum voluntary isometric contraction were performed for each movement and the average of the values was used for analysis. Each measurement lasted 5 seconds with an interval of 30 seconds for resting. The evaluation followed the positioning protocol presented in Figure 2, and the dynamometer placing varied according to the muscle group evaluated: abductors, dynamometer positioned approximately 10 cm above the knee joint; extensors, dynamometer positioned approximately 10 cm above the popliteal foramen; flexors, dynamometer positioned 10 cm above the patella; internal (IR) and external (ER) rotators, dynamometer positioned 5cm above the lateral (IR) and medial (ER) malleolus (Figure 2).[13] All PT measurements were normalized by body mass according to the equation $PT = peak\ of\ torque\ (Nm)\ /\ body\ mass\ (Kg)\ x100$.

Functional Capacity

Functional capacity was assessed using Timed Up and Go Test (TUG) and Harris Hip Score (HHS) questionnaire, which have excellent validity and reliability.[14,15] To perform the TUG test, participants rose from a chair without the support of their arms, walked 3 meters, at their usual speed, using their auxiliary devices if necessary, until they reached a mark on the floor, turned around, walked back to the chair and sat down.[16,17] The HHS has a score ranging from 0 to 100, distributed across the domains: pain, function-gait, function-activity, deformity and ROM. According to the obtained scores, the results were classified as: poor, below 70 points; normal, 70-79 points; good, 80-89 points; excellent, 90-100 points.[9]

Femoral Offset

VFO and HFO measurement was performed from radiographs of the pelvis (anteroposterior view), with the patient in the supine position and lower limbs neutrally positioned, obtained in the hospitals computerized systems. The VFO was determined by the distance between two parallel lines, one passing through the center of rotation of the femoral head and the other one at the lower limit of the ischial tuberosities (Figure 3). HFO was defined as the distance comprised by a line passing perpendicularly from the center of rotation of the femoral head to the meeting point with another line that passes through the long axis of the femur (Figure 3). According to the literature, from the difference between the HFO of the operated limb and the non-operated limb, the HFO can be classified into: increased, difference of 5mm or more with a larger operated limb; reconstructed, difference of up to 5mm between the limbs; and reduced, difference of less than 5mm, with the operated limb being smaller.[9,18,19]

Statistical Analyses

The Shapiro-Wilk test was used to verify data distribution. In the descriptive analysis, measures of central tendency (median, minimum, and maximum) were applied. In order to analyze the reliability of the ROM and PT measurements, the Intraclass Correlation Coefficient (ICC) was used, which is classified as excellent (ICC> 0.75), satisfactory (ICC = 0.40-0.75) and weak (ICC <0.40), being considered relevant only those classified as at least satisfactory (α <0.05).[20] For the intra-group comparative analysis (operated lower limb and non-operated lower limb) the Wilcoxon test was applied for nonparametric data. For correlational analyses, Spearman's Linear Correlation was used. A significance level (α) of 5% and a confidence interval of 95%

were adopted. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) for Windows (version 22.0).

RESULTS

The data found in this study had a non-normal distribution. 22 individuals (10 men and 12 women) were included, evaluated 23 (10-40) days after surgery, with median age of 61 (41-72) years and a BMI of 29.48 (21.59-37.01) kg/m². More information on the characterization of the sample can be found in Table 1.

All participants received routine care during the hospitalization period, with daily physiotherapy sessions and guidelines related to postoperative care. Regarding functional capacity, the individuals presented a time of 26.41 (12.30-60.38) seconds in performing the TUG test and a score of 57.45 (37.20- 73.50) on the HHS (Table 1).

The internal reliability of the measurements obtained in the present study were considered excellent for both hip PT (ICC=0.95-0.98; $p>0.05$) and ROM (ICC=0.93-0.99; $p<0.05$).

The data regarding FO, LLL, ROM and PT can be seen in Table 2. No statistically significant differences were found between the lower limbs (operated and non-operated) according to the VFO ($p = 0.152$) and HFO ($p = 0.162$). However, from the values of the difference between the members for the HFO, 2 individuals were classified as increased HFO, 2 as reduced and 8 as reconstructed. Statistically significant differences, with lower values in the operated limb, were found in the comparisons between the lower limbs, in relation to: the LLL ($p = 0.006$); hip abduction ($p = 0.001$), flexion ($p = 0.003$) and external rotation ($p = 0.003$) ROM; and hip flexion (p = 0.002), abduction (p = 0.001), extension (p = 0.001), external rotation (p = 0.002) and internal rotation (p = 0.001) PT (Table 2).

Regarding the correlation between the FO (VFO and HFO) and other variables, some relationships were found, but only the following were statistically significant: VFO and external rotation ROM (r = 0.487; p = 0.021); HFO and external rotators PT (r = -0.508; p = 0.016); and, when using the difference between the operated and non-operated VFO, moderate correlations with the TUG test (r = - 0.570; p = 0.006).

DISCUSSION

The present study correlated the findings of FO with those of hip ROM, hip PT, LLL and functional capacity, as well as compared the operated and non-operated lower limbs in patients undergoing primary THA surgery. The main findings of this study refer to the scores of functional capacity, the differences found between the operated and non-operated limbs, and the correlations found between the measurements of the FO and the individuals' ROM, PT and functional capacity.

Based on the score of the HHS questionnaire, classified as bad, and the time of 26.41 (12.30-60.38) seconds taken to perform the TUG test, we observed that the individuals in the present study showed a reduction in their functional capacity considering the post-operative period evaluated. According to Bohannon[21], the time taken to perform the TUG test shows an increase according to age. In a population aged 60-69 years an 8.1 (7.1-9.0) seconds time should be considered a reference value, as in a 70-79 year old population, a 9.2 (8.2-10.2) seconds time should be considered normal. Values higher than those of reference suggest disturbances.[21] These alterations may be related to balance, muscle strength and/or mobility disorders, frequently found in individuals in the recent post-operative period of THA, as is the case of the patients in this study (about 23 days post-operatively).[22-25]

Our findings are in line with those of other studies, which also found positive correlations between the FO and THA patients' functional capacity.[26,27] In the present study, statistically significant correlations were found between FO and the TUG test, but not with HHS questionnaire. These findings suggest that the greater the difference between MIO and MINO, that is, when there is an increase in VFO in MIO in relation to MINO, the shorter the time to perform the TUG test and the better the score obtained. The association found with the TUG test, but not with HHS, may be related to the fact that the TUG is a dynamic test that comprises movements used in daily life, being more directly involved and dependent on biomechanical issues, since it allows assessing sitting balance, transferring from sitting to standing position, stability in ambulation and change of direction.[26]

Buecking et al.[27], contrary to our findings, found correlations between the FO and the HHS questionnaire, but not with the TUG test, while Hartel et al.[28] found no correlations between FO and functional capacity. It is worth mentioning, however, that those studies differ from ours regarding patients profile, since they had a higher age average[27,28], underwent THA due to femoral neck fracture[27,28] and in some cases had associated pathologies (dementia, sarcopenia and / or neurological disorders)[28], which makes comparing studies difficult.

The reductions found in the operated limb, compared to the non-operated limb, in relation to hip ROM and PT, can be expected due to the trauma of the surgical procedure, especially in a recent postoperative period such as that of the present study. According to our knowledge, this study was one of the few to search for correlations between FO and hip ROM in patients with THA. Positive correlations were found, suggesting that an increased VFO could be related to the greater hip external rotation range of motion. In a study by McGrory et al.[7], positive correlations between FO and ROM were also found, but in relation to hip abduction.

Several studies point to a positive correlation between the FO and the muscular strength of the hip abductors, suggesting that a restored or slightly increased FO would bring mechanical advantage to the hip abductor muscles, greater stability and functionality, and smaller reaction force in the hip joint. [5,8,9,23] The present study did not find such correlations, but it was the first to find a correlation between FO and hip external rotators PT. The results presented suggest that the higher the HFO, the lower the external rotators PT, that is, an increased HFO in the operated limb would result in a lower muscle force generation of external rotors, represented by a lower PT.

It is difficult to compare the results found in the present study with those found in other studies, as they differ methodologically from ours in some points: assessment of hip abductors muscle strength only[5,8,9,19]; longer postoperative period (6 months to 29 years)[5,9,19]; measurement of muscle strength in an isokinetic dynamometer[5,9,19]; measurement of FO through computed tomography; use of HFO only or global FO (sum of HFO and VFO)[5,8,9,19].

The main limitations of this study refer to: the impossibility of grouping individuals, for comparison matters, according to the increase and decrease in FO, due to the sample size; and the use of simple radiographs instead of computed tomography to measure the FO, which may have underestimated the real differences. According to Sariali et al.[29], measurement on radiographs leads to an underestimation of the FO between 3.5-13mm. We believe, however, that this underestimation does not seem to be relevant in this case, as we used the comparison between the operated and non-operated sides. Furthermore, simple radiography is a low-cost and easy-to-access test that does not expose the patient to greater risks, being widely used to measure FO in the clinical setting.

The paper findings allow us to conclude that changes in the femoral offset measurements (horizontal and vertical), resulting from the surgical procedure of total hip arthroplasty, can influence the functional capacity, as well as the range of motion and muscle strength of the external rotators of the hip. These results reinforce that biomechanical factors resulting from surgery must be considered in future works.

AKNOWLEDGEMENTS

The authors would like to thank the professionals of the orthopedics and traumatology services at Hospital de Clínicas de Porto Alegre, Hospital Santa Clara at Santa Casa de Misericórdia de Porto Alegre, Hospital Cristo Redentor at Grupo Hospitalar Nossa Senhora da Conceição and Universidade Federal de Ciências da Saúde de Porto Alegre. The authors would also like to thank the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brazil (CAPES), since they have financed a part of this study (Finance Code 001).

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

AUTHORS 'CONTRIBUTION

Each author contributed individually and significantly to the development of this article. BML: contact and clinical evaluation of patients, writing of the article; LFS: surgery, writing of the article; CRG; surgeries and article review; CS: surgeries and article review; MFS: article review, intellectual research concept.

REFERENCES

1. Sizínio H. Ortopedia e Traumatologia: princípios e prática. 4ª ed. Porto Alegre: Artmed; 2009.
2. Ongo JR, Onggo JD, Steiger R, Hau R. The Efficacy and safety of inpatient rehabilitation compared with home discharge after hip or knee arthroplasty: a meta-analysis and systematic review. The Journal of Arthroplasty. 2019; 34:1823-1830.
3. Lecerf G, Fessy MH, Philippot R, Massin P, Giraud F, Flecher X et al. Femoral offset: anatomical concept, definition, assessment, implications for preoperative templating and hip arthroplasty. Orthopaedics & Traumatology: Surgery & Research 2009; 95: 210-219.
4. Asayama I, Naito M, Fujisawa M, Kambe T. Relationship between radiographic measurements of reconstructed hip joint position and the Trendelenburg sign. Journal of Arthroplasty 2002; 17: 747-751.
5. Asayama I, Chamnonkich S, Simpson K. Reconstructed hip joint position and abductor muscle strength after total hip arthroplasty. Journal of Arthroplasty 2005; 20(4): 414-420.
6. Yamaguchi T, Naito M, Asayama I, Ishiko T. Total hip arthroplasty: the relationship between posterolateral reconstruction, abductor muscle strength,

and femoral offset. Journal of Orthopaedic Surgery and Research 2004; 12(2): 164-167.

7. McGrory BJ, Morrey BF, Cahalan TD, Na KN, Cabanela ME. Effect of femoral offset on range of motion and abductor muscle strength after total hip arthroplasty. Journal of Bone and Joint Surgery 1995; 77B: 865-869.
8. Mahmood SS, Mukka SS, Crnalic S, Wretenberg P, Sayed-Noord AS. Association between changes in global femoral offset after total hip arthroplasty and function, quality of life, and abductor muscle strength. Acta Orthopaedica 2016; 87(1): 36-4.
9. Chamnongkich S, Asayama I, Kinsey TL, Mahoney OM, Simpson KJ. Difference in hip prosthesis femoral offset affects hip abductor strength and gait characteristics during obstacle crossing. Orthopedic Clinics of North America 2012; 43: e48-e58.
10. Tezuka T, Inaba Y, Kobayashi N, Ike H, Kubota S, Kawamura M. Effects of hip joint center location and femoral offset on abductor muscle strength after total hip arthroplasty. Modern Rheumatology 2015; 25(4): 630-636.
11. Miashiro EH, Fukili EN, Yamaguchi EN, Chikude T, Rodrigues LHS, Fontes GM et al. Planejamento pré-operatório de artroplastias totais primárias de quadril com o uso de radiografias convencionais. Revista Brasileira de Ortopedia 2014; 49(2): 140-148.
12. Monteiro GA. Manual de utilização do flexímetro Sanny. São Paulo: Sanny; 2000.
13. Poulsen E, Christensen HW, Penny JØ, Overgaard S, Vach W, Hartvigsen J. Reproducibility of range of motion and muscle strength measurements in

patients with hip osteoarthritis – a inter-rater study. BMC Musculoskeletal Dirsorders 2012; 13: 242.

14. Bijur P, Silver W, Gallagher J. Reliability of the Visual Analog Scale for Measurement of Acute Pain. Academic Emergency Medicine 2001; 8: 1153-1157.
15. Bookwala J, Harralson T, Parmelee P. Efects of pain on functioning and well-being in older adults with osteoarthritis of the knee. Psychology and Aging 2003; 18: 844-850.
16. Blyth FM, March LM, Brnabic AJ, Cousins MJ. Chronic pain and frequent use of health care. Pain 2004; 111: 51-58.
17. Patrizzi LJ, Vilaça KHC, Takata ET, Trigueiro G. Análise Pré e Pós-Operatória da Capacidade Funcional e Qualidade de Vida de Pacientes Portadores de Osteoartrose de Quadril Submetidos à Artroplastia Total. Revista Brasileira de Reumatologia 2004; 44: 185-191.
18. Clement ND, Patrick-Patel RS, MacDonald D, Breusch SJ. Total hip replacement: increasing femoral offset improves functional outcome. Arch Orthop Trauma Surg 2016; 136: 1317-1323.
19. Sato H, Maezawa K, Gomi M, Kajihara H, Hayashi A, Maruyama Y et al. Effect of femoral offset and limb length discrepancy on hip joint muscle strength and gait trajectory after total hip arthroplasty. Gait & Posture 2020; 77: 276-282.
20. Fleiss JL, Levin B, Paik MC. Statistical Methods for Rates and Proportions. 3. ed. John Wiley & Sons Inc, 2003.
21. Bohannon RW. Reference values for the timed up and go test: a descriptive meta-analysis. J Geriatr Phys Ther 2006; 29(2): 64-68.

22. Frost KL, Bertocci GE, Wassinger C, Munin MC, Burdett RG, Fitzgerald SG. Isometric performance following total hip arthroplasty and rehabilitation. J Rehabil Res Dev 2006; 43(4): 435-444.
23. Skoffer B, Dalgas U, Mechlenburg I. Progressive resistance training before and after total hip and knee arthroplasty: a systematic review. Clinical Rehabilitation 2015; 29(1): 14–29.
24. Shih CH, Du YK, Lin YH, Wu CC. Muscular recovery around the hip joint after total hip arthroplasty. Clin Orthop Relat Res 1994; 115–120.
25. Sicard-Rosenbaum L, Light KE, Behrman AL. Gait, lower extremity strength, and self-assessed mobility after hip arthroplasty. Journal of Gerontology 2002; 57(1): 47–51.
26. Cassidy KA, Noticewala MS, Macaulay W, Lee JH, Geller JA. Effect of femoral offset on pain and function after total hip arthroplasty. J Arthroplasty 2012; 27(10): 1863-9.
27. Buecking B, Boese CK, Bergmeister VA, Frink M, Ruchholtz S, Lechler P. Functional implications of femoral offset following hemiarthroplasty for displaced femoral neck fracture. Int Orthop 2016; 40(7): 1515-1521.
28. Hartel M, Arndt M, Eulenburg CZ, Petersen JP, Rueger JM, Hoffmann M. Restoration of hip architecture with bipolar hemiarthroplasty in the elderly: does it affect early functional outcome? Arch Othop Trauma Surg 2014; 134(1): 31-38.
29. Sariali E, Mouttet A, Pasquier G, Durante E, Catone Y. Three-dimensional hip anatomy in osteoarthritis – analysis of the femoral offset. J Arthroplasty 2009; 24(6): 990-997.

TABLES

Table 1. Total hip arthroplasty patient's characterization.

	THA patients (n =22)
Age (years)	61.00 (41.00 – 72.00)
Sex (M/F)	10/12
Height (m)	1.67 (1.39 - 1.78)
Weight (kg)	77.00 (57.00 - 100.50)
BMI (kg/m2)	29.58 (21.59 - 37.010)
P.O. Period (days)	23.00 (10.00 – 40.00)
Fixation Tipe (H/C)	14/8
Controlateral hip prosthesis (Y/N)	5/17
Auxiliary Device (1C/2C/W)	2/8/12
TUG(s)	26.41 (12.30 - 60.38)
HHS	57.45 (37.20 – 73.50)

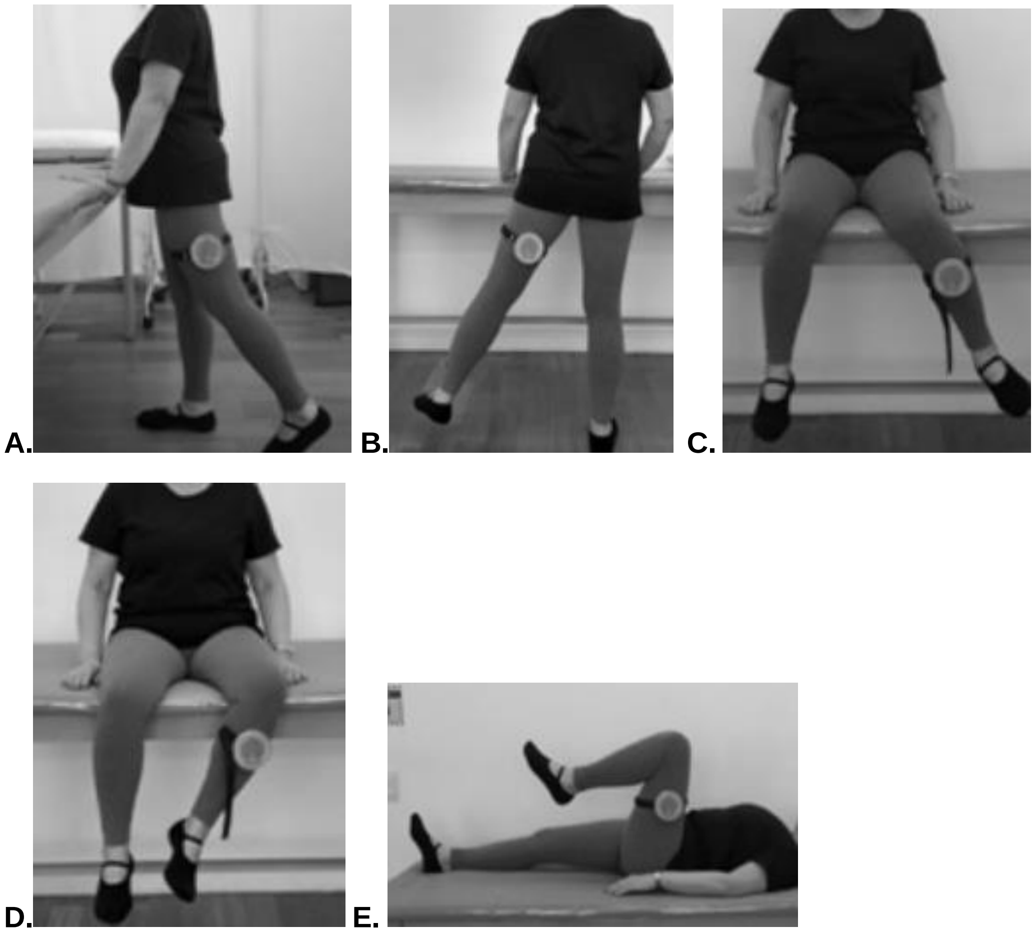
1C: one crutch; **2C:** two crutches; **BMI:** body mass index; **C:** cimented; **F:** female; **H:** hybrid; **M:** male; **N**: no; **P.O.:** postoerative; **TUG:** Timed Up and Go Test; **Y:** yes ; **W:** walker. Values expressed as median (minimum-maximum).

Table 2. Comparison between operated and non-operated lower limbs for joint range of motion (degrees), normalized muscle torque peaks (Nm / kg), femoral offset (mm) and lower limb length (cm).

		OLL	**NOLL**
LLL		86.25 (72.00 – 99.00) *	87.00 (73.00 – 97.00)
Offset	**VOF**	30.00 (21.00-44.00)	28.00 (20.00-45.00)
	HOF	17.50 (10.00-22.00)	17.50 (13.00-33.00)
ROM	**Flexion**	41.50 (11.00 – 56.00) *	60.00 (15.00 – 90.00)
	Extension	19.50 (10.00 – 26.00)	19.00 (7.00 – 40.00)
	Abduction	15.00 (8.00 – 32.00) *	21.50 (14.00 – 40.00)
	IR	15.00 (6.00 – 30.00)	17.50 (4.00 – 35.00)
	ER	10.00 (3.00 – 26.00) *	18.00 (1.00 – 37.00)
PT	**Flexion**	114.00 (54.00– 247.00) *	186.00 (52.00 – 257.00)
	Extension	67.00 (30.00 – 173.00) *	117.00 (37.00 – 323.00)
	Abduction	68.00 (36.00 – 184.00) *	114.00 (16.00 –314.00)
	IR	43.00 (29.00 – 137.00) *	92.00 (36.00 – 202.00)
	ER	73.00 (30.00 – 137.00) *	109.00 (38.00 – 167.00)

HFO: horizontal femoral offset; **IR:** internal rotation; **ER:** external rotation; **OLL:** operated lower limb; **NOLL:** non-operated lower limb; **PT:** peak muscle torque; **ROM:** range of motion; **VFO:** vertical femoral offset. Values expressed as median (minimum-maximum). *****p>0.05.

Figure 1 – Range of motion assessment positions.

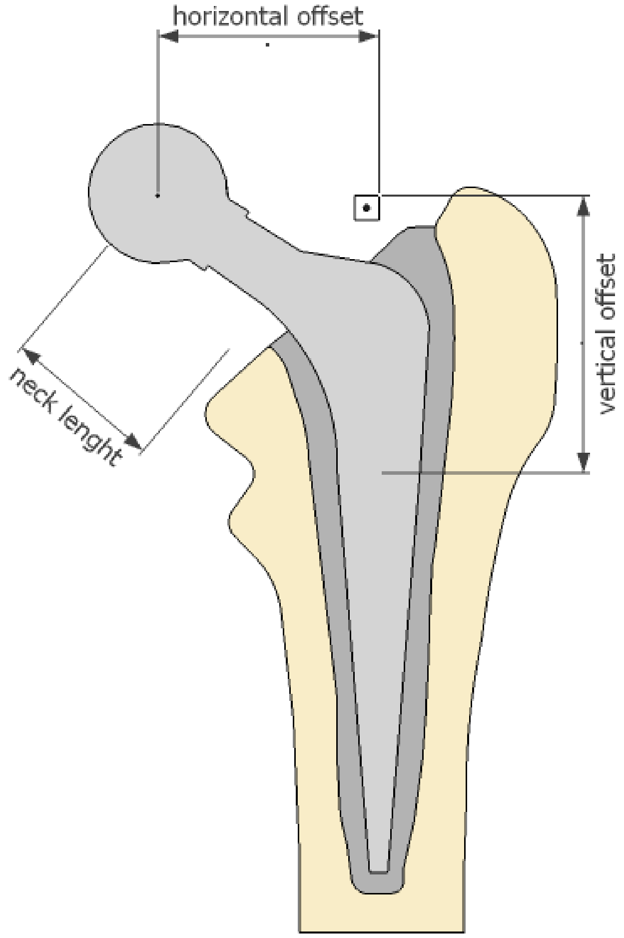


A. Assessment of left hip extension; **B.** Assessment of left hip abduction; **C.** Assessment of left hip internal rotation; **D.** Assessment of left hip external rotation; **E.** Assessment of left hip flexion;

Figure 2 – Muscle torque assessment positions.

A. Hip internal rotator isometric muscle torque assessment; **B.** Hip external rotator isometric muscle torque assessment; **C.** Hip flexors isometric muscle torque assessment; **D.** Hip abductor isometric muscle torque assessment; **E.** Hip extensors isometric muscle torque assessment.

Figure 3 – Femoral Offset.



5.2 ARTIGO 2

Sugestão de submissão na revista *"Archives of Physical Medicine and Rehabilitation"* – *Ed. Física: A1; Med I: B1; FI: 2.888*

FACE-TO-FACE EXERCISES ARE NOT SUPERIOR TO TELE-REHABILITATION IN THE RECENT POST-OPERATIVE TOTAL HIP ARTHROPLASTY: RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Objective: compare a face-to-face exercise program (face-to-face group [FG]) to telerehabilitation (telerehabilitation group [TG]), in patients undergoing total hip arthroplasty (THA).

Methodology: randomized clinical trial with 24 participants: 14 in the FG, which held weekly exercise sessions with face-to-face supervision in the clinic; and 10 in the TG, which performed exercises at home, with guidance from the booklet and weekly calls from the researchers. All participants underwent 6 weeks of intervention and were evaluated, by a blinded evaluator, in the pre- and post-intervention moments for: pain (numerical pain scale); kinesiophobia (Tampa Scale); functional capacity (Harris Hip Score - HHS and Timed Up and Go - TUG); joint range of motion (ROM); and peak muscle torque (PT).

Results: post-intervention only the TG (p = 0.018; d = 1,744) showed improvement in the results of the TUG, however both TG (p = 0.043; d = 1,876) and FG (p = 0.002; d = 1,854) showed improvement in the results. HHS results. There was an increase in post-intervention ROM, in FG, 9 degrees (p = 0.013; d = 1,028) in abduction and 5 degrees in the extension (p = 0.037; d = 0.949) of the operated lower limb (MIO), and in the TG, 18 degrees (p = 0.028; d = 1,571) in flexion of the MIO and 12 degrees (p = 0.027; d = 1,298) in the extension of the non-operated lower limb (MINO). After the interventions, there was an increase, in the MIO, of 119.02% (p = 0.028; d = 2,409) in the PT of the abductors of the TG and of 71.08% (p = 0.023; d = 1,003) of the GF, as well as in the external rotators, 92.21% (p =

0.018; d = 0.862) in the TG and 130.65% (p = 0.016; d = 1,386) in the FG. There were no significant post-intervention differences between groups.
Conclusion: telerehabilitation proved to be as effective as face-to-face rehabilitation in improving PT, ROM and functional capacity of patients in the initial stage of THA rehabilitation. It can be considered a low-cost and easy access alternative in this post-operative phase.

Keywords: rehabilitation; muscle strength; osteoarthritis; hip prosthesis.

INTRODUCTION

Hip osteoarthritis (OA) causes pain, immobility and functional disability[1-4], and it is estimated that one in four people will develop this condition throughout life.[5] Non-surgical treatments are often the first choice in their management, however, in advanced cases, total hip arthroplasty (THA) surgery is recommended.[6]
The number of THA performed in the world has been growing annually, it is estimated a 219% worldwide increase in the number of THA performed until the year 2046, representing a higher cost to the health system.[7] Despite the high levels of quality of life (84-97%) 8 reported, evidence indicates that individuals undergoing THA surgery may persist with functional changes, movement restrictions and deficits in muscle strength for one or two years in the postoperative period.[9-13]
Physiotherapy has become a routine component in the rehabilitation of patients with THA[13], however, the literature presents great variation in relation to: intervention - home programs (guidelines or booklets)[6,14-16] or exercises with face-to-face supervision[6,15,17,18]; exercises - on the ground[14,15,16,17,18,19] or in the water[18]; with load[18] or without load[14,15,16,17,18,19]; frequency - ranging from twice a day to twice a week[19]; protocol duration - ranging from 4 weeks to 3 months[13]; and patients' postoperative period - ranging from shortly after hospital discharge[18,20,21] to 12-24 months postoperatively.[14-17,22]
Considering that post-discharge health care can be difficult for many patients with THA, due to accessibility and costs[19,23], some studies[19,22,23]

investigated the application of home exercise protocols, supervised or not, performed in the immediate or late postoperative period, and demonstrated that they were able to promote improvement in muscle strength, functionality and gait speed in patients with THA.[19,22,23] Such studies, however, have methodological limitations, since even in the case of randomized clinical trials, they did not conceal the allocation or blinding of the evaluators.[19,22,23] The literature therefore lacks studies that investigate the application of affordable and affordable alternatives for the rehabilitation of THA patients, in order to optimize their recovery and avoid deficits in the long term. Thus, the objective of this study was to compare the effects of an exercise protocol performed under face-to-face supervision (face-to-face), in the clinical environment, to a home exercise program (telerehabilitation), accompanied by distance monitoring, in patients undergoing THA surgery.

METHODS

Study Design

A randomized clinical trial was carried out, following the rules of the CONSORT Statement.[24] This study was approved by the University's Research Ethics Committee (protocol 3.049.371) and registered with ClinicalTrials (NCT3208829). Before the beginning of the procedures, the participants read, agreed and signed the free and informed consent form.

Participants

The sample calculation was performed based on an average difference of 10.84Nm regarding the peak torque of the hip abductors15, assuming a standard deviation of 11 points for group 1 and 10, for group 2, an alpha level of 0.05 and 80% power. Thus, a minimum total of 56 patients was obtained, 28 in each group.

The groups were composed of patients (men and women), aged over 45 years, from 3 hospitals in the city of Porto Alegre (RS, Brazil), who underwent primary THA surgery (10-30 days postoperatively). Individuals with: postoperative complications (infections, deep vein thrombosis, prosthesis dislocation, periprosthetic fractures and neural injuries) were excluded from the study; performing a surgical procedure on the lower limbs for less than 6 months; muscle injuries for less than 3 months on the lower limbs; cardiovascular diseases with the presence of disability (severe heart failure); and neurological diseases (stroke with sequelae, Parkinson's disease, neurodegenerative diseases); and those who were already undergoing physical therapy treatment.

Outcomes

Participants performed two assessments: initial (pre-intervention), performed before randomization; and post-intervention, within 7 days after the end of 6 weeks of follow-up. Evaluations were carried out by a researcher blinded when allocating individuals.

Pain and Kinesiophobia

The intensity of pain in the operated hip was assessed using the Numerical Pain Scale (NPS), which consists of eleven points, numbered from 0 to 10.[25] The participants were instructed to consider the worst pain they had experienced in the last week. To assess the presence of kinesiophobia, the Tampa Kinesiophobia Scale was applied, translated, validated and adapted in Brazil.[26] A questionnaire consists of 17 questions that address the pain and intensity of symptoms. The scores vary from one to four points, with the answer “totally disagree” is equivalent to one point, “partially disagree”, to two points, “partially agree”, to three points and “totally agree”, to four points. To obtain the final total score, it is necessary to invert the scores of questions 4, 8, 12 and 16. The final score can be a minimum of 17 and a maximum of 68 points, the higher the score being, the higher the degree of kinesiophobia.[26]

Self-Reported Functional Capacity

Self-reported functional capacity was measured using the Harris Hip Score (HHS) questionnaire[27], with excellent validity and reliability.[27,28] HHS is an instrument for assessing the hip joint, whose scores range from 0 to 100 points, distributed through the pain (0-44 points), gait function (0-33 points), function-activity (0-14 points), deformity (0-4 points) and range of motion (0-

5 points). According to the scores obtained, the results are classified as: poor, below 70 points; normal, 70-79 points; good, 80-89 points; excellent, 90-100 points.[29]

Objectively Measured Functional Capacity

Objectively measured functional capacity was assessed using the Timed Up and Go Test (TUG)[30,31], which has excellent validity and reliability.[27,28,30] To perform the TUG test, participants were instructed to get up from a chair without arm support, walk 3 meters, at your usual speed, using your auxiliary devices if necessary, until a mark on the floor, where you should turn around in a cone, return to the chair and sit.[31,32]

Range of motion

The active range of motion (ROM) was assessed in both hips, by a single evaluator, using a fleximeter (model FL6010, Sanny, Brazil), which showed excellent intra-examiner reliability, in the present study, in three measurements (ICC = 0.935- 0.994; $p < 0.05$). The movements were evaluated in the following positions: hip flexion, in supine position, starting with the knee extended and ending with the knee flexed; hip extension and abduction, in orthostasis; internal and external rotation of the hip, with the patient sitting on the edge of the stretcher, with 90º flexion of the hip and knee (Figure 1).[33] Participants performed each movement three times, and were interrupted if compensatory movements were observed in the pelvis or in the pelvis. trunk. For analysis, the averages of the three measures of each movement were used.

Muscle strength

Muscle strength was represented by the measurement of the isometric peak torque (PT), in both lower limbs, using a portable dynamometer (model HHD 01165, Laffayete, United States), which demonstrated excellent reliability, in this study, intra-examiners, throughout three measurements (ICC = 0.939-0.980; $p < 0.05$). For each muscle group, three maximum isometric contractions were performed, lasting 5 seconds and an interval of 30 seconds for rest.34 The evaluation followed the following positioning

protocol: hip abductors, in lateral decubitus with the evaluated limb facing upwards with extension knee, while the opposite limb remained positioned at 45º of hip and knee flexion, the patient was asked to raise the lower limb in 5cm of abduction and 5º in extension, and the dynamometer was positioned approximately 10 cm above the joint of the knee; hip extensors, in prone position, with the lower limbs in knee extension and the dynamometer, approximately 10 cm above the popliteal foramen; hip flexors, with the individual sitting on the stretcher with both legs hanging down, the participant was asked to raise the lower limb between 5-10° and the dynamometer was positioned 10 cm above the patella; internal and external hip rotators, with the individual sitting on the stretcher with the lower limbs hanging, at 90, of knee and hip flexion, and the dynamometer positioned 5 cm above the lateral malleolus (internal rotation) and medial (external rotation) (Figure 2).[34] The means of the three measurements were used for analysis, and the PT values were normalized by body mass according to the equation PT = peak torque (Nm) / body mass (kg) x100.
The order of the lower limbs measured in fleximetry and dynamometry was previously randomized with Randomizers - www.random.org.

Randomization and Allocation

After the initial evaluation, individuals were randomized into two groups of physical therapy treatment: Face-to-Face Group (FG) and Telerehabilitation Group (TG). An assistant researcher, who was not involved in the collections or monitoring of patients, was responsible for generating a numerical sequence on random.org and hiding that information in opaque envelopes numbered in sequence. The assistant researcher, responsible for the training protocols, opened the envelopes at the end of the pre-intervention assessment, to allocate the individuals to one of the two physical therapy groups.

Protocols

Hospital Phase

All patients were operated by orthopedic surgeons, with superior experience for 10 years, using a posterolateral approach and with early post-operative weight bearing of the operated lower limb. During hospitalization, all patients received standard physical therapy from the hospital where they were admitted, with daily sessions, consisting of: metabolic exercises (plantiflexion and dorsiflexion); isometric contraction of hamstrings, quadriceps and glutes; passive, active-assisted or active mobilization of the operated limb; bedside sedation on the first postoperative day; getting out of bed and walking training with support according to tolerance. The progression of the exercises was adapted according to the patient, and one of the criteria used for discharge was walking with the use of an auxiliary device.

Post-discharge phase

Both protocols lasted 6 weeks and consisted of bilateral exercises (performed with operated and non-operated lower limbs), with a frequency of twice a week. All recommendations and exercises aimed at increasing hip ROM, strengthening lower limb muscles and promote weight bearing in the operated limb, through functional movements, respecting the care and restrictions recommended in the THA postoperative period.

The two protocols included the same exercises: bridge (elevation of the pelvis in supine position); knee and hip flexion in supine position; sitting knee extension; sit and stand; plantiflexion in orthostasis; knee flexion in orthostasis. Three sets of 12 repetitions were performed for each exercise. After the randomization process, the members of the TG received the illustrated booklet and general guidelines, as well as explanations and demonstrations of all exercises to be performed at home, while the individuals of the FG performed the exercises under the researchers' face-to-face supervision. TG members were monitored through weekly calls from researchers to clarify doubts, and had access to researchers via calls or text messages whenever they needed.

Statistical analysis

Data distribution was analysed using the Shapiro Wilk test. Even though a normal distribution was found, it was decided to adopt non-parametric tests due to the sample size. To analyse the reliability and reproducibility of peak torque measurements, the intraclass correlation coefficient (ICC - Intraclass Correlation Coefficient) was used, which was classified as excellent (ICC> 0.75), satisfactory (ICC = 0.40-0.75), and poor (ICC <0.40) 36, and only those classified as at least satisfactory (α <0.05) were considered relevant. For comparisons between groups, the Mann-Whitney test was used. The effect of the interventions was represented by the relative variation, calculated using the equation: ($Value_{post}$ – $Value_{pre}$) / $Value_{pre}$ x 100, where $Value_{pre}$ is the median of the pre-intervention measure and $Value_{post}$ is the median of the post-intervention measure. The intervention effect For the intragroup analysis, the Wilcoxon test was used and the effect size (TF) through Cohen's d [effect size = (M_{post} - M_{pre}) / DP_{group}, where M_{post} is the mean of the post-intervention measure, M_{pre} is the mean of the pre-intervention measure, and $DP_{aggregated}$ is the pooled standard deviation of the pre and post-intervention measures], and the training effects were considered as: insignificant (d <0.19); small (d = 0.20-0.49); medium (d = 0.50-0.79); large (d> 0.80) .37 For descriptive analysis, we chose to use measures of central tendency (median) of the data and the 25th and 75th percentiles. We adopted a significance level (α) of 5% and an interval of 95% confidence. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) for Windows (version 18.0).

RESULTS

In the period from May 2018 to March 2020, 80 potential participants were contacted to participate in the survey. 26 refused to participate, 12 presented with exclusion criteria, 14 were already undergoing physical therapy and 4 did not attend the initial assessment. Of the remaining patients, 24 met the inclusion criteria and were randomized, 14 in the FG and 10 in the TG. Over the 6 weeks of treatment, we had 4 losses, 3 of which were dropouts (1 in the FG and 2 in the TG), and one patient (TG) developed deep venous thrombosis, with exercise being contraindicated (Figure 1). The groups did not present significant differences (p>0.05) in the initial assessment regarding age, body mass index (BMI), time of illness and time after the operation and their characterization can be seen in Table 1.

Pain and Kinesiophobia

Both TG and FG presented low levels of pain according to the Numerical Pain Scale scores, in the two assessments (pre and post-intervention), with no statistically significant differences between (pre-intervention *p=0.698*; post-intervention *p=0.967*) or intra-groups (TG *p=0.443*; FG *p=0.090*). Regarding the kinesiophobia scores indicated by the Tampa Scale, no significant differences were found when comparing the pre and post-training assessments (TG *p=0.271*; FG *p=0.461*), or between groups (pre-intervention *p=0.905*; post-intervention *p=0.266*) (Table 2).

Self-Reported and Objectively Measured Functional Capacity

Regarding self-reported functionality, patients had significantly higher HHS scores in the post evaluation compared to the pre-intervention, with a large effect size, both in the TG (*d=1.876*) as in FG (*d=1.854*). No significant differences were found between groups (Table 2).

Regarding the objectively measured functionality, a significant difference (*p=0.036*) was found between the groups in the pre-intervention assessment, where the individuals in the TG needed more time to perform the test. Both groups showed a reduction in the time taken to perform the test in the post-intervention evaluation (TG = 26.9 seconds; FG = 7.8 seconds), but only the differences found for the TG were considered significant (*p=0.018*; *d=1.744*). No significant differences were found (*p=0.501*) between groups in the post-intervention assessment (Table 2).

Range of motion

Regarding ROM, individuals showed a significant increase, witrh a large effect size, in the range of motion of the lower limbs, in the post-intervention moment (Table 3). The FG showed a statistically significant increase in abduction *(p=0.013; d=1.028)* and in extension (*p=0.037*; *d=0.949*) in the operated lower limb. The TG showed a statistically significant increase in operated lower limb flexion (*p=0.028*; *d=1.571*) and in non-operated lower limb extension (*p=0.027*; *d=1.298*) (Table 3).

Muscle strength

The individuals in the TG and FG showed significant differences in the peak torque of the abductors and external rotators in the operated lower limb when comparing the pre- and post-intervention evaluations. An increase of can be observed in the PT of the abductors in the TG (*p=0.028*; *d=2.409*) and in the FG (*p=0.023*; *d=1.003*), as well as an increase in the PT of the external rotators in the TG (*p=0.018*; *d=0.862*) and in the FG (*p=0.016*; *d=1.386*) (Table 4).

The effect (difference before and after intervention) of the treatments on the parameters of pain, kinesiophobia, self-reported and objectively measured functional capacity, ROM and muscle strength, can be seen in Table 5. According to the results of the relative variation, the effect of interventions were similar in both groups.

DISCUSSION

After the application of two rehabilitation protocols, lasting six weeks, no significant differences were found between the groups (on-site and at home), in relation to the analysed outcomes (pain, kinesiophobia, functional capacity, ROM and muscle strength). According to our knowledge, this was the first blinded controlled and randomized clinical trial to compare two different forms of rehabilitation - an exercise protocol performed under face-to-face supervision in the clinical setting, and a home exercise program, with remote monitoring -, in patients undergoing THA surgery.

Regardless of the group, individuals showed an improvement in functional capacity after physical therapy monitoring. The findings by Galea et al.[23] corroborate ours, showing no differences between groups in self-reported functional capacity. In their study, however, unlike ours, the group of supervised face-to-face exercises performed significantly better on the TUG test.[23] A population-based study demonstrated that differences greater than 2.4 seconds in the TUG test can be considered clinically relevant.[38] Thus, we can consider that, in the present study, even without statistically significant differences, there was a clinically relevant improvement in the functional capacity objectively measured, in both groups, after the interventions were performed, since the individuals presented reductions between 7.80-26.90 seconds performing the TUG test.[38] It should be noted that in the study by Galea et al.[23], unlike ours, the home group did not receive calls or follow-up during the intervention period and the evaluators were not blinded to the allocation of the participants.

Both protocols were able to increase the peak torque of the abductors and external rotators of the operated lower limb. Even though the GP made use of shin guards, no significant differences in peak torque were found between the groups, which suggests that, at this stage of rehabilitation, the use of external load increases does not seem to add benefits to the treatment. Considering that evidence points to the weakness of hip abductors as one of the main deficits found in patients with THA[39,40], and in view of its fundamental role in maintaining postural stability, trunk control and gait performance, the importance of rehabilitation protocols that facilitate their rapid recovery, reducing the risk of falls and promoting the patient's return to their functional activities.[41] Contrary to our results, Unlu et al.[15] observed higher values of strength of the hip muscles in the group that performed exercises supervised in person. However, the groups showed a significant difference in peak torque, in the pre-intervention assessment, which may have influenced the results of the study.[15]

No studies were found in the literature with a methodology similar to ours that evaluated the ROM of patients with THA, which makes it difficult to compare the results found in the present study. Despite occasional improvements in ROM, the two groups, from a clinical point of view, persist with important limitations. According to Polkowski et al.[42], a typical individual needs between 67-124 degrees of flexion, 18-33 degrees of abduction and 15-26 degrees of external hip rotation to perform functional activities such as: tying shoes; going up and down stairs; and sit and get up from a chair.

The present study has limitations with regard to the absence of a longer follow-up period and a possible response bias in relation to the records of exercises performed in the DG participants, since this information was self-reported.

In view of the difficulties in accessing traditional physical therapy treatment, the results of the present study, in agreement with previous studies about home treatment and / or telerehabilitation in patients with lower limb arthroplasty[14,23,43], bring home exercises associated with remote monitoring as an alternative in the physiotherapeutic treatment of patients with THA.

CONCLUSION

The findings of the present study allow us to conclude that no differences were found between an exercise protocol with face-to-face supervision, and a telerehabilitation program, in patients in recent postoperative THA, for the outcomes of pain, kinesiophobia, capacity functional, ROM and muscle strength. Both forms of rehabilitation were able to promote improvement in the functional capacity, range of motion and muscle strength of individuals in this post-operative period, and proved to be safe and easily reproducible.

ACKNOWLEDGMENT

The authors would like to acknowledge the professionals of the orthopedics and traumatology services at the Hospital de Clínicas de Porto Alegre, the Hospital Santa Clara da Santa Casa de Misericórdia in Porto Alegre, the Hospital Cristo Redentor of the Hospital Group Nossa Senhora da Conceição and the Federal University of Sciences of the Porto Alegre Health for your assistance.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

FINANCING

This study was financed, in part, by the Coordination for the Improvement of Higher Education Personnel - Brazil (CAPES) - financing code 001.

REFERENCES

1. Szymanski C, Thouvarecqe R, Dujardinb F, Migaudd H, Maynoua C, Girardc J. Functional performance after hip resurfacing or total hip replacement: a comparative assessment with non-operated subjects. Orthopaedics & Traumatology: Surgery & Research. 2012;98:1-7.

2. Gadia JA, Marques AP, Miranda FG. Avaliação da dor, capacidade funcional e amplitude articular em pacientes submetidos a artroplastia total de quadril. Acta Ortop Bras. 1999;7(4):159-66.
3. Guedes RC, Dias J, Dias RC, Borges VS, Lustosa LP, Rosa NM. Artroplastia total de quadril em idosos: impacto na funcionalidade. Rev Bras Fisioter. 2011;15(2):123-30.
4. Tanaka R, Shigematsu M, Motooka T, Mawatari M, Hotokebuchi T. Factors Influencing the Improvement of Gait Ability After Total Hip Arthroplasty. The Journal of Arthroplasty. 2010;25(6):982-5.
5. Murphy LB, Helmick CG, Schwartz TA, et al. One in four people may develop symptomatic hip osteoarthritis in his or her lifetime. Osteoarthr Cartil. 2010;18(11):1372–1379. doi: 10.1016/j.joca.2010.08.005.
6. Skoffer B, Dalgas U, Mechlenburg I. Progressive resistance training before and after total hip and knee arthroplasty: a systematic review. Clinical Rehabilitation. 2015;29(1):14–29.
7. Ongo JR, Onggo JD, Steiger R, Hau R. The Efficacy and safety of inpatient rehabilitation compared with home discharge after hip or knee arthroplasty: a meta-analysis and systematic review. The Journal of Arthroplasty. 2019; 34:1823-1830.
8. Shan L, Shan B, Graham D, Saxena A. Total hip replacement: a systematic review and meta-analysis on mid-term quality of life. Osteoarthristis and Cartilage. 2014; 22(3):389-406.
9. Rasch A, Dalén N, Berg HE. Muscle strength, gait, and balance in 20 patients with hip osteoarthritis followed for 2 years after total hip arthroplasty. Acta Orthopedica. 2010; 81(2):183-188.
10. Knox M. Outcomes of total hip arthroplasty: a study of patients one year postsurgery. J Orthop Sporsts Phys Ther. 2002; 32(9):469-470.
11. Nallegowda M, Singh U, Bhan S, Wadhwa S, Handa G, Dwivedi SN. Balance and Gait in Total Hip Arthroplasty. Am J Phys Med Rehabil. 2003; 82(9):669-677.
12. Okoro T, Ramavath A, Howarth J, et al. What does standard rehabilitation practice after total hip replacement in the UK entail? Results of a mixed methods study. BMC Musculoskelet Disord. 2013;14(1):91.

13. Coulter CL, Scarvell JM, Neeman TM, Smith PN. Physiotherapist-directed rehabilitation exercises in the outpatient or home setting improve strength, gait speed and cadence after elective total hip replacement: a systematic review. Journal of Physiotherapy. 2013; 59:219-26.
14. Jan MH, Hung JY, Lion JCH, Wang SF, Liu TK, Tang PF. Effects of a home program on strength, walking speed, and function after total hip replacement. Arch Phys Med Rehabil. 2004;85:1943-51.
15. Unlu E, Eksioglu E, Aydog E, Aydoth ST, Atay G. The effect of exercise on hip muscle strength, gait speed and cadence in patients with total hip arthroplasty: a randomized controlled study. Clin Rehabil. 2007;21(8):706–11.
16. Trudelle-Jackson E, Ermeson R, Smith S. Outcomes of Total Hip Arthroplasty: A Study of Patients One Year Postsurgery. J Orthop Sports Phys Ther. 2002;32(6):260-7.
17. Monaghan B, Grant T, Hing W, Cusack T. Functional exercise after total hip replacement (FEATHER): a randomised control trial. BMC Musculoskelet Disord. 2012;13(1):237
18. Husby VS, Helgerud J, Bjørgen S, Husby OS, Benum P, Hoff J. Early maximal strength training is an efficient treatment for patients operated with total hip arthroplasty. Arch Phys Med Rehabil. 2009;90(10):1658–67.
19. Nelson M, Bourke M, Crossley K, Russell T. Telerehabilitation is non-inferior to usual care following total hip replacement: a randomized controlled non-inferiority trial. Physiotherapy. 2019; 107:19-27.
20. Lowe CJM, Barker KL, Dewey ME, Sackley CM. Effectiveness of physiotherapy exercise following hip arthroplasty for osteoarthritis : a systematic review of clinical trials. BMC Musculoskelet Disord. 2009;14:1–14.
21. Gilbey HJ, Ackland TR, Wang AW, Morton AR, Trouchet T, Trapper J. Exercise improves early functional recovery after total hip arthroplasty. Clin Orthop Relat Res. 2003;(408):193-200.
22. Sashika H, Matsuba Y, Watanabe Y. Home program of physical therapy: effect on disabilities of patients with total hip arthroplasty. Arch Phys Med Rehabil. 1996;77:273-7.

23. Galea M, Levinger P, Lythgo N, Cimoli C, Weller R, Tully E et al. Targeted home- and center-based exercise program for people after total hip replacement: a randomized clinical trial. Archives of Physical Medicine & Rehabilitation. 2008; 89:1442-47.
24. CONSORT Statement disponível em: http://www.consort-statement.org/. Acesso em 23 de junho de 2020.
25. Farrar JT, Young Jr JP, LaMoreaux L, Werth JL, Poole RM. Clinical importance of changes in chronic pain intensity measured on na 11-point numerical pain rating scale. Pain. 2001; 94:149-158.
26. Siqueira FB, Teixeira-Salmela LF, Magalhães LC. Analysis of the psychometric properties of the brazilian version of the tampa scale of kinesiophobia. Acta Ortop Bras. 2007; 15(1):19-24.
27. Guimarães R, Alves DPL, Silva GB, Bittar ST, Ono NK, Honda E, Polesello GC, Junior WR, Carvalho N. Translation and cultural adaptation of the Harris Hip Score into portuguese. Acta Ortopédica Brasileira. 2010; 18:142-47.
28. Thrane G, Joakimsen RM, Thornquist E. The association between timed up and go test and history of falls: The Tromso study. BioMed Central Geriatrics. 2007; 12:7-1.
29. Patrizzi LJ, Vilaça KHC, Takata ET, Trigueiro G. Análise Pré e Pós-Operatória da Capacidade Funcional e Qualidade de Vida de Pacientes Portadores de Osteoartrose de Quadril Submetidos à Artroplastia Total. Revista Brasileira de Reumatologia. 2004; 44:185-191.
30. Bijur P, Silver W, Gallagher J. Reliability of the Visual Analog Scale for Measurement of Acute Pain. Academic Emergency Medicine. 2001; 8:1153-1157.
31. Bookwala J, Harralson T, Parmelee P. Efects of pain on functioning and well-being in older adults with osteoarthritis of the knee. Psychology and Aging. 2003; 18:844-850.
32. Blyth FM, March LM, Brnabic AJ, Cousins MJ. Chronic pain and frequent use of health care. Pain. 2004; 111:51-58.
33. Monteiro GA. Manual de utilização do flexímetro Sanny. São Paulo: Sanny; 2000.

34. Poulsen E, Christensen HW, Penny JØ, Overgaard S, Vach W, Hartvigsen J. Reproducibility of range of motion and muscle strength measurements in patients with hip osteoarthritis – a inter-rater study. BMC Musculoskeletal Dirsorders. 2012; 13:242.
35. Wang AW, Gilbey HJ, Ackland TR. Perioperative exercise programs improve early return of ambulatory function after total hip arthroplasty: a randomized, controlled trial. Am J Phys Med Rehabil. 2002;81(11):801–6.
36. Fleiss JL, Levin B, Paik MC. Statistical Methods for Rates and Proportions. 3. ed. John Wiley & Sons Inc; 2003.
37. Cohen, J. Statistical power analysis for the behavioral sciences. 2.ª ed. Hillsdale: Lawrence Erlbaum Associates; 1988.
38. Mathias S, Nayak US, Isaacs B. Balance in elderly patients: The “Get-up and Go” test. Archives of Physical Medicine and Rehabilitation. 1986; 67:387-9.
39. Frost KL, Bertocci GE, Wassinger C, Munin MC, Burdett RG, Fitzgerald SG. Isometric performance following total hip arthroplasty and rehabilitation. J Rehabil Res Dev. 2006;43(4):435-44.
40. Sicard-Rosenbaum L, Light KE, Behrman AL. Gait, lower extremity strength, and self-assessed mobility after hip arthroplasty. Journal of Gerontology. 2002;57(1):47–51.
41. Loizeau J, Allard P, Duhaime M, Landjerit B. Bilateral gait patterns in subjects fitted with a total hip prosthesis. Arch Phys Med Rehabil. 1995; 76:552-557.
42. Polkowski GG, Clohisy JC. Hip Biomechanics. Sports Medicine and Arthroscopy Review. 2010;18:56-62.
43. Bettger JP, Green CL, Holmes DN, Chokshi A, Mather RC, Hoch BT, Leon AJ, Aluisio F, Seyler TM, Gaizo DJD, Chiavetta J, Webb L, Miller V, Smith J, Peterson E. Effects of virtual exercise rehabilitation in-home therapy compared with traditional care after total knee arthroplasty. J Bone Joint Surg Am. 2019; 00(00):1-9.

Table 1 – Characterization of the sample of the Telerehabilitation and Face-to-face groups.

Variables	Telerehabilitation Group (n=7)	*Face-to-face* Group(n=13)	*p*
Age (years)	60.50 (47.00;69.00)	61.00 (59.00;67.75)	0.206
BMI (kg/m²)	28.80 (26.90;33.30)	30.10 (26.60;33.70)	0.968
Gender			
Male	2 (20%)	10 (71.42%)	
Female	8 (80%)	4 (28.58%)	
Illness Time (years)	5.00 (2.37;15.25)	6.00 (1.54;14.25)	0.837
P.O. Time (days)	24.00 (19.00;30.00)	25.00 (19.00;30.00)	0.556
Prosthesis Type			
Cemented	3 (30%)	4 (28.60%)	
Cementless/Hybrid	7 (70%)	10 (71.40%)	
Contralateral THA			
Yes	1 (10%)	3 (21.43%)	
No	9 (90%)	11 (78.57%)	
Operated LL			
Dominant	4 (40%)	8 (57.14%)	
Non-dominant	6 (60%)	6 (42.86%)	

BMI: body mass index; LL: lower limb; P.O.: post-operative; THA: total hip arthroplasty. Data presented as median (P25;P75) or n (%). *$p<0.05$

Table 2 – Pain (numerical pain scale), Kinesiophobia (Tampa scale) and functional capacity (Harris Hip Score and Timed Up and Go) in the Telerehabilitation and Face-to-face groups.

		Telerehabilitation Group (n=7)	***Face-to-face* Group (n=13)**	***p***	***d between groups***
NPS	Pre	1.00 (2.00;5.00)	3.00 (1.00;6.00)	*0.698*	
	Post	1.00 (0.00;4.00)	1.00 (0.00;3.00)	*0.967*	*0.043*
	intragroup p	*0.443*	*0.090*		
	intragroup d	*0.477*	*0.662*		
Tampa	Pre	33.00 (31.00; 44.00)	37.00 (30.00;41.00)	*0.905*	
	Post	28.00 (27.00;41.00)	34.00 (30.00;38.00)	*0.266*	*0.315*
	intragroup p	*0.271*	*0.461*		
	intragroup d	*0.659*	*0.308*		
TUG(s)	Pre	44.40 (31.10;66.00)	24.10 (18.00;36.40)	*0.036**	
	Post	17.50 (13.40;21.90)	16.30 (11.10;19.70)	*0.501*	*0.015*
	intragroup p	*0.018**	*0.064*		
	intragroup d	*1.744*	*0.718*		
HHS	Pre	56.00 (40.80;61.70)	58.40 (49.60;68.80)	*0.285*	
	Post	81.50 (76.80;86.50)	78.20 (71.50;90.00)	*0.843*	*0.066*
	intragroup p	*0.043**	*0.002**		
	intragroup d	*1.876*	*1.854*		

HHS: *Harris Hip Score*; TUG: *Timed Up and Go* test; NPS: Numerical Pain Scale. Data presented as median (P25;P75) or Cohen *d*; *p<0.05.

Table 3 - Range of motion (ROM) of the hip before and after training in the Telerehabilitation and Face-to-face groups, expressed in degrees.

ROM		Operated Lower Limb: Telerehabilitation Group (n=7)	Operated Lower Limb: *Face-to-face* Group (n=13)	*p*	Non-operated Lower Limb: Telerehabilitation Group (n=7)	Non-operated Lower Limb: *Face-to-face* Group (n=13)	*p*
Abduction	Pre	13.00 (11.00;24.00)	15.00 (14.00;17.50)	*0.520*	25.00 (17.00;30.00)	22.00 (18.00;24.50)	*0.381*
	Post	23.00 (20.00;30.00)	24.00 (17.00;33.00)	*0.662*	29.00 (24.00;35.00)	25.00 (20.00;30.00)	*0.379*
	intragroup p	*0.075*	*0.013**		*0.150*	*0.064*	
	intragroup d	*1.028*	*1.042*		*0.611*	*0.441*	
Extension	Pre	15.00 (15.00;19.00)	20.00 (15.00;24.00)	*0.166*	13.00 (12.00;24.00)	20.00 (15.00;29.00)	*0.102*
	Post	24.00 (14.00;30.00)	25.00 (19.50;29.00)	*0.577*	25.00 (20.00;30.00)	25.00 (18.00;27.50)	*0.905*
	intragroup p	*0.075*	*0.037**		*0.027**	*0.286*	
	intragroup d	*0.949*	*0.931*		*1.298*	*0.292*	
Flexion	Pre	35.00 (24.00;43.00)	45.00 (34.00;51.00)	*0.218*	54.00 (35.00;79.00)	60.00 (43.00;63.50)	*0.905*
	Post	53.00 (49.00;58.00)	48.00 (40.00;62.50)	*0.605*	62.00 (51.00;66.00)	55.00 (39.50;65.50)	*0.427*
	intragroup p	*0.028**	*0.136*		*0.672*	*1.000*	
	intragroup d	*1.571*	*0.723*		*0.252*	*0.025*	
Internal Rotation	Pre	15.00 (10.00;19.00)	14.00 (10.00;20.00)	*0.905*	20.00 (19.00;27.00)	16.00 (10.00;20.00)	*0.163*
	Post	15.00 (12.00;25.00)	15.00 (14.00;21.00)	*0.935*	23.00 (15.00;27.00)	22.00 (12.50;28.50)	*0.751*
	intragroup p	*0.612*	*0.381*		*0.752*	*0.123*	
	intragroup d	*0.411*	*0.276*		*0.161*	*0.022*	
External Rotation	Pre	10.00 (6.00;11.00)	10.00 (5.50;14.50)	*0.874*	20.00 (15.00;30.00)	16.00 (12.50;21.50)	*0.190*
	Post	11.00 (10.00;12.00)	12.00 (10.00;15.00)	*0.354*	21.00 (15.00;25.00)	15.00 (11.00;18.50)	*0.095*
	intragroup p	*0.528*	*0.333*		*0.733*	*0.969*	
	intragroup d	*1.929*	*0.476*		*0.244*	*0.696*	

Data presented as median (P25;P75); **p*<0.05; effect size represented as *Cohen's d.*

Table 4 - Torque peaks before and after training in the Telerehabilitation and Face-to-face groups, expressed in Nm/kgx100.

		Operated Lower Limb			Non-operated Lower Limb		
Variables		**Telerehabilitation Group (n=7)**	***Face-to-face* Group (n=13)**	***p***	**Telerehabilitation Group (n=7)**	***Face-to-face* Group (n=13)**	***Face-to-face***
Abduction	Pre	58.46 (40.41;63.64)	85.66 (51.28;132.34)	*0.104*	123.65 (72.33;152.24)	114.20 (71.92;205.09)	*0.721*
	Post	128.04 (99.70;149.30)	148.26 (124.46;196.93)	*0.251*	148.49 (121.16;204.48)	159.07 (103.57;216.89)	*0.721*
	intragroup p	*0.028**	*0.023**		*0.091*	*0.345*	
	intragroup d	*2.409*	*1.003*		*0.772*	*0.206*	
Extension	Pre	53.05 (47.24;115.01)	83.81 (65.53;156.66)	*0.166*	97.42 (57.48;135.51)	108.69 (88.28;187.45)	*0.219*
	Post	123.62 (52.08;157.09)	157.27 (75.37;184.61)	*0.501*	131.52 (60.07;196.35)	164.70 (94.47;230.05)	*0.322*
	intragroup p	*0.128*	*0.173*		*0.176*	*0.345*	
	intragroup d	*1.081*	*0.479*		*0.600*	*0.384*	
Flexion	Pre	86.14 (73.52;92.92)	173.16 (104.86;199.16)	*0.008**	135.26 (105.82;204.62)	190.65 (148.55;231.71)	*0.088*
	Post	130.59 (114.59;169.65)	189.74 (148.86;231.92)	*0.036*	159.38 (99.47;202.45)	201.76 (132.47;263.53)	*0.251*
	intragroup p	*0.128*	*0.249*		*0.612*	*0.552*	
	intragroup d	*1.157*	*0.418*		*0.194*	*0.086*	
Internal Rotation	Pre	51.32 (38.43;63.48)	88.96 (52.79;109.97)	*0.036**	78.77 (62.24;91.22)	100.73 (57.28;145.84)	*0.405*
	Post	74.24 (50.48;107.96)	71.91 (62.52;113.83)	*0.606*	102.04 (64.13;126.74)	103.56 (60.56;143.41)	*0.968*
	intragroup p	*0.310*	*0.917*		*0.499*	*0.861*	
	intragroup d	*0.861*	*0.031*		*0.055*	*0.029*	
External Rotation	Pre	41.71 (38.37;49.10)	43.26 (34.56;77.47)	*0.968*	98.40 (69.91;123.67)	108.56 (66.18;129.11)	*0.721*
	Post	80.17 (66.30;93.33)	99.78 (80.38;121.43)	*0.104*	113.02 (63.28;131.85)	123.93 (67.36;145.37)	*0.501*
	intragroup p	*0.018**	*0.016**		*0.866*	*0.279*	
	intragroup d	*0.862*	*1.386*		*0.445*	*0.292*	

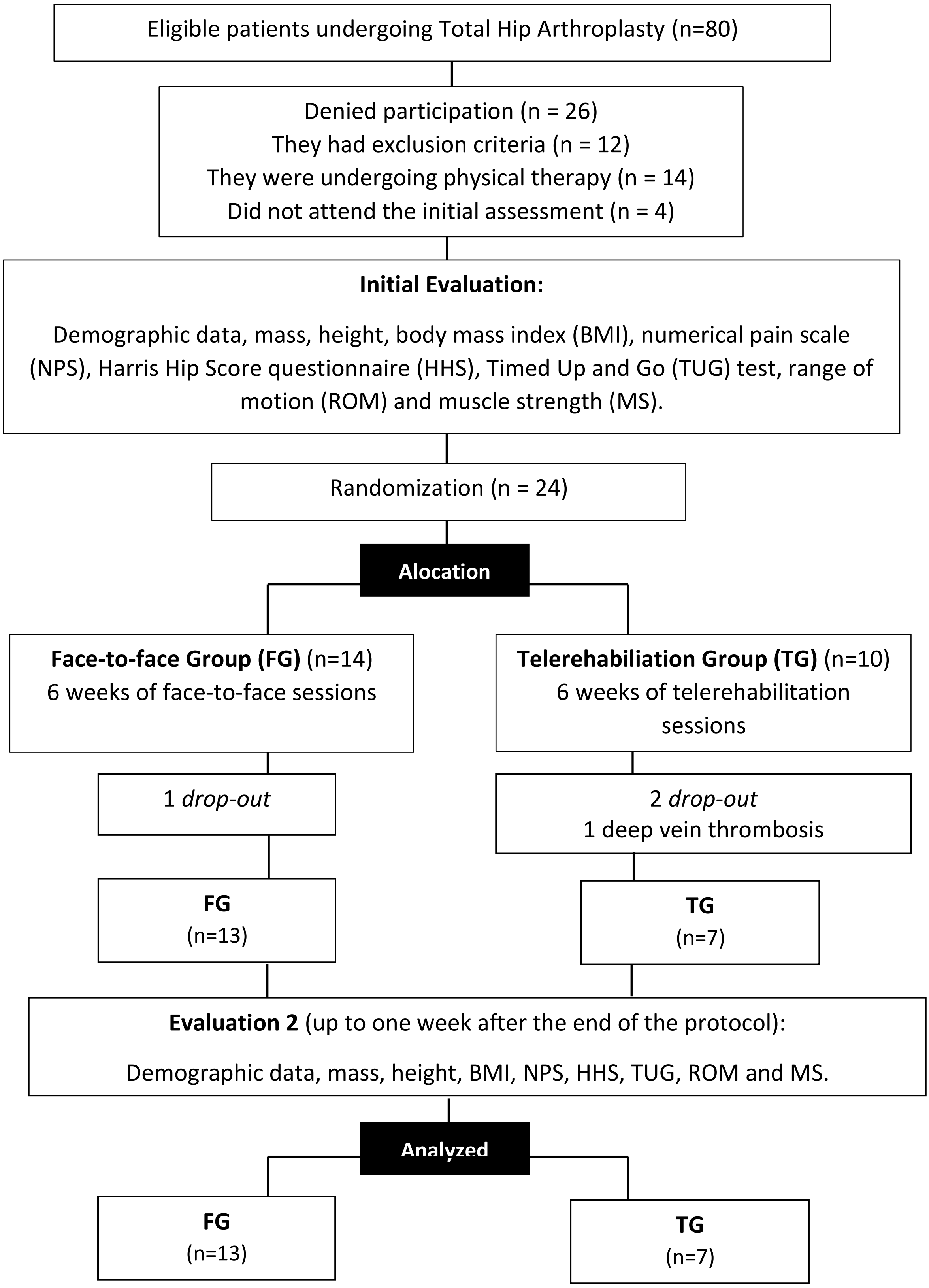
Data presented as median (P25;P75); *p<0.05; effect size represented as *Cohen's d.*

Table 5 – Effect of the intervention in the Telerehabilitation and Face-to-face groups, represented by the relative variation (Δ).

	Δ Telerehabiliation (n=7)	**Δ Face-to-face (n=13)**	***p***
NPS	-80.00 (-95.00; 200.00)	-60.00 (-95.00; 00.00)	*1.000*
TAMPA	-25.80 (-36.40; 24.20)	-05.70 (-16.20; 19.40)	*0.405*
TUG (s)	-61.20 (-66.80; -59.00)	-33.70 (-64.20; -01.00)	*0.122*
HHS	50.00 (27.70; 112.00)	36.00 (21.80; 49.40)	*0.362*
Range of Motion			
Operated Lower Limb			
Abduction	66.70 (-19.20; 109.10)	60.00 (-07.70; 113.30)	*0.874*
Extension	60.00 (-18.80; 66.70)	25.00 (00.00; 66.70)	*0.721*
Flexion	38.90 (14.00; 120.80)	25.00 (03.80; 41.30)	*0.322*
Internal Rotation	20.00 (-25.00; 133.30)	15.40 (-19.00; 60.00)	*1.000*
External Rotation	10.00 (-09.10; 100.00)	00.00 (-14.30; 66.70)	*0.721*
Non-Operated Lower Limb			
Abduction	16.00 (-10.00; 50;00)	13.60 (07.10; 25.00)	*0.905*
Extension	25.00 (11.10; 92.30)	08.30 (00.00; 66.70)	*0.250*
Flexion	20.40 (-16.50; 45.70)	00.00 (-21.40; 40.00)	*0.663*
Internal Rotation	26.30 (-34.30; 70.00)	35.00 (-06.30; 116.70)	*0.721*
External Rotation	-20.00 (-30.00; 71.40)	06.70 (-15.00; 17.60)	*0.968*
Peak Torque			
Operated Lower Limb			
Abduction	134.60 (38.10; 252.20)	80.90 (-14.70; 278.50)	*0.663*
Extension	105.30 (04.20; 239.10)	98.70 (-11.20; 134.20)	*0.552*
Flexion	51.80 (28.70; 115.90)	16.30 (05.70; 70.80)	*0.362*
Internal Rotation	72.00 (38.80; 123.80)	151.90 (07.60; 226.70)	*0.606*
External Rotation	01.20 (-01.90; 93.20)	15.70 (-45.30; 85.40)	*0.452*
Non-Operated Lower Limb			
Abduction	25.90 (04.90; 110.30)	19.10 (-13.30; 83.40)	*0.663*
Extension	35.00 (-16.70; 53.60)	23.90 (-12.70; 94.30)	*0.968*
Flexion	18.90 (-16.20; 50.60)	02.10 (-17.80; 46.10)	*0.968*
Internal Rotation	-04.10 (-27.40; 25.30)	22.20 (-18.00; 51.30)	*0.606*
External Rotation	13.30 (-29.70; 74.00)	-00.40 (-15.20; 21.80)	*0.843*

HHS: *Harris Hip Score*; TUG: *Timed Up and Go* test; NPS: Numerical Pain Scale. Data presented as median (P25;P75); $p<0.05$

Figure 1 – Flowchart**.**



6 CONCLUSÃO GERAL

Os resultados dos estudos apresentados nessa tese, permitem concluir que tanto um protocolo de exercícios com supervisão *face-to-face*, como um programa de telerreabilitação, foram capazes de promover melhora na capacidade funcional, na amplitude de movimento e na força muscular de pacientes em pós-operatório recente de artroplastia total de quadril unilateral. Os dois protocolos mostraram-se seguros e de fácil reprodutibilidade, e o acompanhamento à distância mostrou-se uma alternativa confiável ao tratamento convencional.

No que se refere à correlação de critérios ortopédicos de análise de imagem com desfechos clínicos, os resultados permitem concluir que alterações nas medidas de *offset* femoral (horizontal e vertical) estão correlacionadas à capacidade funcional, bem como à amplitude de movimento e força muscular dos rotadores externos do quadril. Desse modo, ressalta-se a importância dos aspectos biomecânicos no planejamento e nos resultados das cirurgias de prótese de quadril, bem como a relevância de investigações à cerca de seu impacto na recuperação dos pacientes.

ANEXO I - QUESTIONÁRIO HARRIS HIP SCORE

Data da Avaliação: ____/____/_______

Avaliação: ( ) Pré ( ) Pós ( ) Follow-up ( ) única

Nº Identificação Voluntário: _______

Grupo: ______________________

Nome: ____

ESCORE (valor)	CLASSIFICAÇÃO

Dor (44 possíveis)
A) Nenhuma ou ignora 44
B) Leve, ocasional, sem comprometimento das atividades 40
C) Dor fraca, não afeta a prática de atividades comuns, raramente dor moderada após a prática de atividades incomuns, pode fazer uso de analgésico simples 30
D) Dor moderada, tolerável, mas convive com limitação causada pela dor. Alguma limitação para atividades comuns ou no trabalho. Pode ocasionalmente necessitar de medicação para dor mais forte que analgésico simples 20
E) Acentuada, atividades bastante limitadas 10
F) Totalmente incapacitado, aleijado, dor na cama, acamado 0

II. Função (47 possíveis)
A. Marcha (33 possíveis)
1. Claudicação
a) Nenhuma 11
b) Leve 8
c) Moderada 5
d) Severa 0

2. Apoio
a) Nenhum 11
b) Bengala para caminhadas longas 7
c) Bengala a maior parte do tempo 5
d) Uma muleta 3
e) Duas bengalas 2
f) Duas muletas 0
g) Não consegue andar (especificar o motivo) 0

3. Distância que consegue andar
a) Ilimitada 11
b) 6 quarteirões 8
c) 2-3 quarteirões 5
d) Apenas dentro de casa 2
e) Da cama até a cadeira 0

B. Atividades (14 possíveis)
1. Subir e descer escada
a) Normalmente sem segurar no corrimão 4
b) Normalmente segurando no corrimão 2

c) De alguma maneira 1
d) Não consegue subir nem descer escada 0

2. Calçar sapato e meia
a) Com facilidade 4
b) Com dificuldade 2
c) Não consegue 0

3. Sentar
a) Senta-se confortavelmente em cadeira comum durante uma hora 5
b) Senta-se em cadeira alta durante meia hora 3
c) Não consegue sentar-se de forma confortável em nenhuma cadeira 0

4. Tomar transporte público 1
III considera-se não haver pontos de **deformidade** (4) quando o paciente apresenta:
A) Contratura em flexão fixa inferior a 30o
B) Contratura em adução fixa inferior a 10o
C) Contratura em rotação interna fixa em extensão inferior a 10o
D) Discrepância no comprimento dos membros inferior a 3,2 centímetros

IV. **Amplitude de movimento** (o valor do índice é calculado pela multiplicação dos graus de movimento possíveis de cada arco pelo respectivo índice)

A. Flexão 0—45 graus X 1,0
45—90° X 0,6
90—110° X 0,3

B. Abdução 0—15° X 0.8
15—20° X 0,3
mais de 20° X 0

C. Rotação externa em extensão
0—15° X 0.4
mais de 15° X 0

D. Rotação interna em extensão qualquer X 0

E. Adução 0—15° X 0,2

ANEXO II – ESCALA DE CINESIOFOBIA DE TAMPA

Para cada afirmativa, por favor, indique um número de 1 a 4, caso você concorde ou discorde da afirmativa. Primeiro você vai pensar se concorda ou discorda e depois, se totalmente ou parcialmente.

	Discordo totalmente	**Discordo parcialmente**	**Concordo parcialmente**	**Concordo totalmente**
1. Eu tenho medo que eu possa me machucar se eu fizer exercícios	1	2	3	4
2. Se eu tentasse superar esse medo, minha dor aumentaria.	1	2	3	4
3. Meu corpo está me dizendo que algo muito errado está acontecendo comigo.	1	2	3	4
4. Minha dor provavelmente seria aliviada se eu fizesse exercício.	1	2	3	4
5. As pessoas não estão levando minha condição médica a serio.	1	2	3	4
6. Minha lesão colocou o meu corpo em risco para o resto da minha vida.	1	2	3	4
7. A dor sempre significa que eu machuquei meu corpo.	1	2	3	4
8. Só porque alguma coisa piora minha dor, não significa que é perigoso.	1	2	3	4
9. Eu tenho medo que eu possa me machucar acidentalmente.	1	2	3	4
10. Simplesmente sendo cuidadoso para não fazer nenhum movimento desnecessário e a atitude mais segura que eu posso tomar para prevenir a piora da minha dor.	1	2	3	4
11. Eu não teria tanta dor se algo potencialmente perigoso não estivesse acontecendo no meu corpo.	1	2	3	4
12. Embora minha condição seja dolorosa, eu estaria melhor se estivesse ativo fisicamente.	1	2	3	4

13. A dor me avisa quando parar o exercício para que eu não me machuque.	1	2	3	4
14. Não é realmente seguro para uma pessoa com minha condição ser ativo fisicamente.	1	2	3	4
15. Eu não posso fazer todas as coisas que as pessoas normais fazem, porque para mim e muito fácil me machucar.	1	2	3	4
16. Embora algo esteja me causando muita dor, eu não acho que seja, de fato, perigoso.	1	2	3	4
17. Ninguém deveria fazer exercícios, quando está com dor.	1	2	3	4

ANEXO III – PARECER DE APROVAÇÃO NO CEP

UNIVERSIDADE FEDERAL DE CIÊNCIAS DA SAÚDE DE PORTO ALEGRE

PARECER CONSUBSTANCIADO DO CEP

DADOS DA EMENDA

Título da Pesquisa: EFEITOS DE UM PROGRAMA DE EXERCÍCIOS BASEADOS NO FORTALECIMENTO MUSCULAR NA REABILITAÇÃO DE INDIVÍDUOS SUBMETIDOS À ARTROPLASTIA TOTAL DE QUADRIL: ENSAIO CLÍNICO

Pesquisador: Marcelo Faria Silva

Área Temática:

Versão: 4

CAAE: 64431017.8.0000.5345

Instituição Proponente: Universidade Federal de Ciências da Saúde de Porto Alegre

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 3.049.371

Apresentação do Projeto:

Trata-se emenda para pedido de inserção do Hospital Cristo Redentor como instituição coparticipante do projeto.

Objetivo da Pesquisa:

Comparar os efeitos de um programa de exercícios baseados no treinamento da força muscular à orientações e exercícios funcionais domiciliares, em pacientes submetidos à ATQ, bem como comparar os desfechos de ambos os grupos aos de indivíduos hígidos.

Avaliação dos Riscos e Benefícios:

Não se aplica.

Comentários e Considerações sobre a Pesquisa:

Foi encaminhada uma Emenda de Centro Coordenador para inserir o Hospital Cristo Redentor com instituição coparticipante. Os pesquisadores requerem a autorização do hospital e dos CEPs para que possam ter acesso à lista de pacientes que realizaram cirurgia de artroplastia total de quadril no local. O acesso a essas informações seria realizado através do sistema de informática do hospital, e posteriormente esses indivíduos seriam contatados e convidados a participar da pesquisa. Ao aceitarem fazer parte, os participantes terão agendada uma avaliação que será realizada na Universidade Federal de Ciências da Saúde de Porto Alegre.

Endereço: Rua Sarmento Leite ,245
Bairro: Sarmento **CEP:** 90.050-170
UF: RS **Município:** PORTO ALEGRE
Telefone: (51)3303-8804 **E-mail:** cep@ufcspa.edu.br

Considerações sobre os Termos de apresentação obrigatória:

Termo de anuência do responsável pelo setor onde será realizada a pesquisa foi anexado. Os pesquisadores se comprometem a levar os resultados à instituição coparticipante ao final.

Termo de compromisso de entrega de relatórios foi submetido.

Recomendações:

Não há.

Conclusões ou Pendências e Lista de Inadequações:

Não há.

Considerações Finais a critério do CEP:

De acordo com o parecer do Relator.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_1249463_E2.pdf	01/11/2018 09:42:12		Aceito
Outros	Curriculo_Bruno_Baroni.pdf	02/10/2018 20:50:16	Marcelo Faria Silva	Aceito
Projeto Detalhado / Brochura Investigador	Projeto_de_Pesquisa_versao_2.doc	02/10/2018 20:48:28	Marcelo Faria Silva	Aceito
Outros	Termo_de_Compromisso_de_Entrega_de_Relatorios_GHC.pdf	02/10/2018 20:45:25	Marcelo Faria Silva	Aceito
Outros	Termo_de_Anuencia_Responsavel_Setor_GHC.pdf	02/10/2018 20:44:39	Marcelo Faria Silva	Aceito
Declaração de Pesquisadores	Relacao_dos_Integrantes_do_Projeto_de_Pesquisa_GHC.pdf	02/10/2018 20:43:25	Marcelo Faria Silva	Aceito
Outros	Carta_ao_CEP_GHC_e_UFCSPA.pdf	08/08/2018 14:56:42	Marcelo Faria Silva	Aceito
Outros	Curriculo_Lattes_Bruna_de_Moraes_Lopes.pdf	08/08/2018 14:51:02	Marcelo Faria Silva	Aceito
Outros	Curriculo_Lattes_Marcelo_Faria_Silva.pdf	08/08/2018 14:50:40	Marcelo Faria Silva	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE_2.pdf	23/03/2017 14:05:17	Marcelo Faria Silva	Aceito
Outros	Termo_de_Anuencia__Lab2.pdf	23/03/2017 14:05:03	Marcelo Faria Silva	Aceito
Projeto Detalhado	Projeto_de_Pesquisa_versao_1.doc	20/01/2017	Marcelo Faria Silva	Aceito

/ Brochura Investigador	Projeto_de_Pesquisa_versao_1.doc	20:02:43	Marcelo Faria Silva	Aceito
Outros	Termo_de_Compromisso_Entrega_de_Relatorio.pdf	20/01/2017 19:56:17	Marcelo Faria Silva	Aceito
Outros	Termo_Anuencia_Laboratorio.pdf	20/01/2017 19:54:58	Marcelo Faria Silva	Aceito
Outros	ANEXO_IX_Prontuario.pdf	20/01/2017 19:54:06	Marcelo Faria Silva	Aceito
Outros	ANEXO_VIII_Cartilha.pdf	20/01/2017 19:53:30	Marcelo Faria Silva	Aceito
Outros	ANEXO_VII_Escala_de_Tampa.pdf	20/01/2017 19:52:39	Marcelo Faria Silva	Aceito
Outros	ANEXO_VI_Harris_Hip_Score.pdf	20/01/2017 19:52:10	Marcelo Faria Silva	Aceito
Outros	ANEXO_V_Escala_Numerica_de_Dor.pdf	20/01/2017 19:51:44	Marcelo Faria Silva	Aceito
Outros	ANEXO_IV_Ficha_Anamnese_Controle.pdf	20/01/2017 19:50:55	Marcelo Faria Silva	Aceito
Outros	ANEXO_III_Ficha_Anamnese_ATQ.pdf	20/01/2017 19:50:20	Marcelo Faria Silva	Aceito
Outros	ANEXO_II_Divulgacao_Redes_Sociais.pdf	20/01/2017 19:49:48	Marcelo Faria Silva	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	ANEXO_I_TCLE_assinado.pdf	20/01/2017 19:44:57	Marcelo Faria Silva	Aceito
Folha de Rosto	Folha_de_Rosto_Assinada.pdf	20/01/2017 11:25:41	Marcelo Faria Silva	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

PORTO ALEGRE, 30 de Novembro de 2018

Assinado por:
Fernanda Bordignon Nunes
(Coordenador(a))

Endereço: Rua Sarmento Leite ,245
Bairro: Sarmento **CEP:** 90.050-170
UF: RS **Município:** PORTO ALEGRE
Telefone: (51)3303-8804 **E-mail:** cep@ufcspa.edu.br

ANEXO IV – NORMAS REVISTA ARTIGO 1

Brazilian Journal of Physical Therapy
Qualis: Educação Física A2
Fator de Impacto: 2.1

INTRODUCTION

Types of article

The Brazilian Journal of Physical Therapy (BJPT) publishes original research articles, reviews, and brief communications on topics related to physical therapy and rehabilitation, including clinical, basic or applied studies on the assessment, prevention and treatment of movement disorders.

Our Editorial Board is committed to disseminate high-quality research in the field of physical therapy. The BJPT follows the principle of publication ethics included in the code of conduct of the Committee on Publication Ethics (COPE).

The BJPT accepts the submission of manuscripts with up to 3,500 words (excluding title page, abstract, references, tables, figures and legends).

Information contained in appendices will be included in the total number of words allowed.

A total of five (5) combined tables and figures is allowed.

The following types of study can be considered for publication, if directly related to the journals scope:

a) *Intervention studies (clinical trials):* studies that investigate the effect(s) of one or more interventions on outcomes directly related to the BJPTs scope. The World Health Organization defines a clinical trial as any research study that prospectively allocates human participants or groups of humans to one or more health-related interventions to evaluate the effect(s) on health outcome(s). Clinical trials include single-case experimental studies, case series, nonrandomized controlled trials, and randomized controlled trials. Randomized controlled trials (RCTs) must follow the CONSORT (Consolidated Standards of Reporting Trials) recommendations, which are available at: http://www.consort-statement.org/consort-statement/overview0/. The CONSORT checklist and Statement Flow Diagram, available at http://www.consort-statement.org/consort-statement/flow-diagram, must be completed and submitted with the manuscript. Clinical trials must provide registration that satisfies the requirements of the International Committee of Medical Journal Editors (ICMJE), e.g. http://clinicaltrials.gov/ and/or http://www.anzctr.org.au.

The complete list of all clinical trial registries can be found at: http://www.who.int/ictrp/network/primary/en/index.html. We suggest that all authors register clinical trials prospectively via the website http://www.clinicaltrials.gov. Note: We do not accept single case studies and series of cases (i.e. clinical trials without a comparison group).

b) Observational studies: studies that investigate the relationship(s) between variables of interest related to the BJPTs scope. Observational studies include cross-sectional studies, cohort studies, and case-control studies. All observational studies must be reported following the recommendation from the STROBE statement (http://strobe-statement.org/index.php?id=strobe-home).

c) Qualitative studies: studies that focus on understanding needs, motivations, and human behavior. The object of a qualitative study is guided by in-depth analysis of a topic, including opinions, attitudes, motivations, and behavioral patterns without quantification. Qualitative studies include documentary and ethnographic analysis.

d) Systematic reviews: studies that analyze and/or synthesize the literature on a topic related to the scope of the BJPT. Systematic reviews that include meta-analysis will have priority over other systematic reviews. Those that have an insufficient number of articles or articles with low quality in the Methods section and do not include an assertive and valid conclusion about the topic will not be considered for peer-review analysis.

The authors must follow the Preferred Reporting Items for Systematic Reviews and MetaAnalyses (PRISMA) checklist to format their systematic reviews. The checklist is available at http://www.prisma-statement.org/PRISMAStatement/Default.aspx and must be filled in and submitted with the manuscript. Potential authors are encouraged to read the following tutorial, which contains the minimum requirements for publication of systematic reviews in the BJPT: Mancini MC, Cardoso JR, Sampaio RF, Costa LCM, Cabral CMN, Costa LOP. Tutorial for writing systematic reviews for the Brazilian Journal of Physical Therapy (BJPT). Braz J Phys Ther. 2014 Nov-Dec; 18(6):471-480.

e) Studies on the translation and cross-cultural adaptation of questionnaires or assessment tools: studies that aim to translate and/or cross-culturally adapt foreign questionnaires to a language other than that of the original version of existing assessment instruments. The authors must use the checklist (Appendix) to format this type of paper and adhere to the other recommendations of the BJPT. The answers to the checklist must be submitted with the manuscript. At the time of submission, the authors must also include written permission from the authors of the original instrument that was translated and/or cross-culturally adapted.

f) Methodological studies: studies centered on the development and/or evaluation of clinimetric properties and characteristics of assessment instruments. The authors are encouraged to use the Guidelines for Reporting Reliability and Agreement Studies (GRRAS) to format methodological papers, in addition to following BJPT instructions. Important: Studies that report electromyographic results must follow the Standards for Reporting EMG Data recommended by ISEK (International Society of Electrophysiology and Kinesiology), available at http://www.isek.org/wp-content/uploads/2015/05/Standards-for-Reporting-EMG-Data.pdf.

g) Clinical trial protocols: The BJPT welcomes the publication of clinical trial protocols. We only accept trial protocols that are substantially funded, have ethics approval, have been prospectively registered and of very high quality. We expect that clinical trial protocols must be novel and with a large sample size. Finally, authors have to provide that the clinical trial is on its first stages of recruitment. Authors should use the SPIRIT statement while formatting the manuscript (http://www.spirit-statement.org).

h) Short communications: the BJPT will publish one short communication per issue (up to six a year) in a format similar to that of the original articles, containing 1200 words and up to two figures, one table, and ten references. i) Masterclass articles: This type of article presents the state of art of any topic that is important to the field of physical therapy. All masterclass articles are invited manuscripts and the authors must be recognized experts in the field. However, authors can send e-mails to the editor in chief with an expression of interest to submit a masterclass article to the BJPT.

Submission checklist

You can use this list to carry out a final check of your submission before you send it to the journal for review. Please check the relevant section in this Guide for Authors for more details.

Ensure that the following items are present:

One author has been designated as the corresponding author with contact details:

• E-mail address

• Full postal address

All necessary files have been uploaded:

Manuscript:

• Include keywords

• All figures (include relevant captions)

• All tables (including titles, description, footnotes)

• Ensure all figure and table citations in the text match the files provided

• Indicate clearly if color should be used for any figures in print Graphical Abstracts / Highlights files (where applicable) Supplemental files (where applicable) Further considerations

• Manuscript has been 'spell checked' and 'grammar checked'

• All references mentioned in the Reference List are cited in the text, and vice versa

• Permission has been obtained for use of copyrighted material from other sources (including the Internet)

• A competing interests statement is provided, even if the authors have no competing interests to declare

• Journal policies detailed in this guide have been reviewed

• Referee suggestions and contact details provided, based on journal requirements For further information, visit our Support Center.

BEFORE YOU BEGIN

Ethics in publishing

Please see our information pages on Ethics in publishing and Ethical guidelines for journal publication.

Studies in humans and animals

If the work involves the use of human subjects, the author should ensure that the work described has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The manuscript should be in line with the Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals and aim for the inclusion of representative human populations (sex, age and ethnicity) as per those recommendations. The terms sex and gender should be used correctly. Authors should include a statement in the manuscript that informed consent was obtained for experimentation with human subjects. The privacy rights of human subjects must always be observed. All animal experiments should comply with the ARRIVE guidelines and should be carried out in accordance with the U.K. Animals (Scientific Procedures) Act, 1986 and associated guidelines, EU Directive 2010/63/EU for animal experiments, or the National Institutes of Health guide for the care and use of Laboratory animals (NIH Publications No. 8023, revised 1978) and the authors should clearly indicate in the manuscript that such guidelines have been followed. The sex of animals must be indicated, and where appropriate, the influence (or association) of sex on the results of the study.

Declaration of interest

All authors must disclose any financial and personal relationships with other people or organizations that could inappropriately influence (bias) their work. Examples of potential competing interests include employment, consultancies, stock ownership, honoraria, paid expert testimony, patent applications/registrations, and grants or other funding.

Authors must disclose any interests in two places: 1. A summary declaration of interest statement in the title page file (if double-blind) or the manuscript file (if single-blind). If there are no interests to declare then please state this: 'Declarations of interest: none'. This summary statement will be ultimately published if the article is accepted. 2. Detailed disclosures as part of a separate Declaration of Interest form, which forms part of the journal's official records. It is important for potential interests to be declared in both places and that the information matches. More information. Submission declaration and verification Submission of an article implies that the work described has not been published previously (except in the form of an abstract, a published lecture or academic thesis, see 'Multiple, redundant or concurrent publication' for more information), that it is not under consideration for publication elsewhere, that its publication is approved by all authors and tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere in the same form, in English or in any other language, including electronically without the written consent of the copyrightholder.

To verify originality, your article may be checked by the originality detection service Crossref Similarity Check. Use of inclusive language Inclusive language acknowledges diversity, conveys respect to all people, is sensitive to differences, and promotes equal opportunities. Articles should make no assumptions about the beliefs or commitments of any reader, should contain nothing which might imply that one individual is superior to another on the grounds of race, sex, culture or any other characteristic, and should use inclusive language throughout. Authors should ensure that writing is free from bias, for instance by using 'he or she', 'his/her' instead of 'he' or 'his', and by making use of job titles that are free of stereotyping (e.g. 'chairperson' instead of 'chairman' and 'flight attendant' instead of 'stewardess').

Authorship

All authors should have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Changes to authorship Authors are expected to consider carefully the list and order of authors before submitting their manuscript and provide the definitive list of authors at the time of the original submission. Any addition, deletion or rearrangement of author names in the authorship list should be made only before the manuscript has been accepted and only if approved by the journal Editor. To request such a change, the Editor must receive the following from the corresponding author: (a) the reason for the change in author list and (b) written confirmation (e-mail, letter) from all authors that they agree with the addition, removal or rearrangement. In the case of addition or removal of authors, this includes confirmation from the author being added or removed. Only in exceptional circumstances will the Editor consider the addition, deletion or rearrangement of authors after the manuscript has been accepted. While the Editor considers the request, publication of the manuscript will be suspended. If the manuscript has already been published in an online issue, any requests approved by the Editor will result in a corrigendum. Clinical trial results In line with the position of the International Committee of Medical Journal Editors, the journal will not consider results posted in the same clinical trials registry in which primary registration resides to be prior publication if the results posted are presented in the form of a brief structured (less than 500 words) abstract or table. However, divulging results in other circumstances (e.g., investors' meetings) is discouraged and may jeopardise consideration of the manuscript. Authors should fully disclose all posting in registries of results of the same or closely related work.

Reporting clinical trials

Randomized controlled trials should be presented according to the CONSORT guidelines. At manuscript submission, authors must provide the CONSORT checklist accompanied by a flow diagram that illustrates the progress of patients through the trial, including recruitment, enrollment, randomization, withdrawal and completion, and a detailed description of the randomization procedure. The CONSORT checklist and template flow diagram are available online. Registration of clinical trials Registration in a public trials registry is a condition for publication of clinical trials in this journal in accordance with International Committee of Medical Journal Editors recommendations. Trials must register at or before the onset of patient enrolment.

The clinical trial registration number should be included at the end of the abstract of the article. A clinical trial is defined as any research study that prospectively assigns human participants or groups of humans to one or more health-related interventions to evaluate the effects of health outcomes. Health-related interventions include any intervention used to modify a biomedical or health-related outcome (for example drugs, surgical procedures, devices, behavioural treatments, dietary interventions, and process-of-care changes). Health outcomes include any biomedical or health-related measures obtained in patients or participants, including pharmacokinetic measures and adverse events. Purely observational studies (those in which the assignment of the medical intervention is not at the discretion of the investigator) will not require registration. Copyright Upon acceptance of an article, authors will be asked to complete a 'Journal Publishing Agreement' (see more information on this) to assign to theAssociao Brasileira de Pesquisa e Ps-Graduao em Fisioterapia (ABRAPG-FT) the copyright in the manuscript and any tables, illustrations or other material submitted for publication as part of the manuscript (the "Article") in all forms and media (whether now known or later developed), throughout the world, in all languages, for the full term of copyright, effective when the Article is accepted for publication. An e-mail will be sent to the corresponding author confirming receipt of the manuscript together with a 'Journal Publishing Agreement' form or a link to the online version of this agreement. Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the Publisher and ABRAPG-FT is required for resale or distribution outside the institution and for all other derivative works, including compilations and translations. If excerpts from other copyrighted works are included, the author(s) must obtain written permission from the copyright owners and credit the source(s) in the article. Author rights As an author you (or your employer or institution) have certain rights to reuse your work. More information.

Find out how you can share your research published in this journal.

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Qualis Educação Física A1

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GUIDE FOR AUTHORS

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Archives of Physical Medicine and Rehabilitation brings readers authoritative information on the therapeutic utilization of physical and pharmaceutical agents in providing comprehensive care for persons with disabilities and for chronically ill individuals. Archives began publication in 1920, publishes monthly, and is the official journal of the ACRM **|** American Congress of Rehabilitation Medicine. Its content is cited more often than any other rehabilitation journal.

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Referees

All submissions will be screened by editors to determine their suitability for further review. Manuscripts that are approved for review will be evaluated by at least one recognized expert in the particular subject matter. Biostatistical review may be obtained.

Peer reviewers' assessments are referred to a member of the Editorial Board, who may also critique the manuscript.

The assigned Editorial Board Member will then make a final decision and communicate with the corresponding author via e-mail. Decisions are typically communicated within 60 days after the manuscript has been approved for peer review.

All reviews are conducted in a double-blind fashion. Letters to the Editors and Editorials are generally evaluated by an editorial committee, however, external reviews may also be sought. Published annually without peer review are the ACRM | American Congress of Rehabilitation Medicine presidential address and the John Stanley Coulter Lecture.

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In addition, highlight each change in the revised manuscript. You will upload this document in the file upload step as the "Detailed Response to Reviewers." Please note that this file should be blinded and should not include author names or institutional letterhead. If revisions are not received within the time specified in the decision e-mail, the manuscript file will be closed.

A revision received after a file has been closed will be handled as a new submission. An extension beyond the deadline may be granted at the Editorial Board's discretion, but only in extenuating circumstances, given the editors' commitment to prompt publication.

Submission of a revised manuscript includes submission of separate documents in the following order: (1) cover letter; (2) title page, including acknowledgments and explanation of any conflicts of interest; (3) main text file with highlighted changes, including an appropriate (structured or standard) abstract, keywords, list of abbreviations, body of the text, suppliers' list, references, figure legends; (4) a clean copy of the main text file with no highlighted changes, including an appropriate abstract, keywords, list of abbreviations, body of the text, suppliers' list, references, figure legends; (5) figures; (6) tables; (7) appendices; (8) supplementary files; (9) checklist; and (10) ICMJE Form for Disclosure of Potential Conflicts of Interest for each author. Resubmissions From time to time an author may receive a decision of "Reject-Resubmit" on their original submission.

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• Indicate per figure if it is a single, 1.5 or 2-column fitting image.

• For Word submissions only, you may still provide figures and their captions, and tables within a single file at the revision stage.

• Please note that individual figure files larger than 10 MB must be provided in separate source files. A detailed guide on electronic artwork is available. You are urged to visit this site; some excerpts from the detailed information are given here. Formats Regardless of the application used, when your electronic artwork is finalized, please 'save as' or convert the images to one of the following formats (note the resolution requirements for line drawings, halftones, and line/halftone combinations given below): EPS (or PDF): Vector drawings. Embed the font or save the text as 'graphics'. TIFF (or JPG): Color or grayscale photographs (halftones): always use a minimum of 300 dpi. TIFF (or JPG): Bitmapped line drawings: use a minimum of 1000 dpi. TIFF (or JPG): Combinations bitmapped line/half-tone (color or grayscale): a minimum of 500 dpi is required.

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• Supply files that are too low in resolution.

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Figure legends

A list of figure legends should be provided after the reference list, listing each figure in order by number. Legends/captions should not be embedded in the figure files themselves.

Figure captions

Ensure that each illustration has a caption. A caption should comprise a brief title (not on the figure itself) and a description of the illustration.

Keep text in the illustrations themselves to a minimum but explain all symbols and abbreviations used.

Tables

Submit each table as a separate file. Accepted file formats are PDF and Word (Please do not upload Excel files). If needed, Excel files will be requested from the authors upon a final editorial decision of accept.

Number tables consecutively in the order of their first citation in the text. Include a brief title for each table, include a short or abbreviated heading for each column. Place explanatory matter in footnotes, not in the title or column headings.

Explain in footnotes all nonstandard abbreviations that are used in each table. For footnotes, use the following symbols, in this sequence: *, †, ‡, §, ||, ¶, #, **, ††, ‡‡ Identify statistical measures of variations such as standard deviation and standard error of the mean. Do not use internal horizontal and vertical rules. Be sure that each table is cited in the text in order. Using too many tables in relation to the length of the text may produce typesetting difficulties.

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Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. 2013. Available at: http://www.icmje.org. Accessed July June 16, 2014. ref2 2. Committee on Publication Ethics.

Flowcharts: Changes in Authorship. nd. Available at: http://www.publicationethics.org/resources/flowcharts. Accessed June 16, 2014. ref3 3. 64th WMA General Assembly. WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. Available at: http://www.wma.net/en/30publications/10policies/b3/. Accessed June 16, 2014. ref4 4. Ottenbacher KJ. Why rehabilitation research does not work (as well as we think it should). Arch Phys Med Rehabil 1995;76:606–9. Updated November 5, 2015

ANEXO VI - NORMAS DO PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS DA REABILITAÇÃO

RESOLUÇÃO Nº 24/2019/CONSUN, DE 10 DE OUTUBRO DE 2019

Dispõe sobre a regulamentação do Programa de Pós-Graduação em Ciências da Reabilitação na Fundação Universidade Federal de Ciências da Saúde de Porto Alegre – UFCSPA.

O CONSELHO UNIVERSITÁRIO DA FUNDAÇÃO UNIVERSIDADE FEDERAL DE CIÊNCIAS DA SAÚDE DE PORTO ALEGRE, no uso de suas atribuições conferidas pelo Estatuto e Regimento Geral desta Universidade, de acordo com o art. 2º, III, de seu Regimento Interno, considerando o parecer favorável da Câmara de Legislação e Normas, nos termos do processo nº 23103.002627/2019-61, em sessão ordinária realizada em 10 de outubro de 2019, RESOLVE aprovar o Regulamento do Programa de Pós-Graduação em Ciências da Reabilitação na Fundação Universidade Federal de Ciências da Saúde de Porto Alegre – UFCSPA:

Objetivos Art. 1º O Programa de Pós-graduação em Ciências da Reabilitação (PPG-CR) da Universidade Federal de Ciências da Saúde de Porto Alegre tem por objetivo a formação pós-graduada na área da saúde, por meio de estudos avançados e pesquisas que levam ao grau de Mestre e de Doutor em Ciências da Reabilitação, de acordo com o que estabelece o Conselho Nacional de Educação, o Estatuto e o Regimento Geral da UFCSPA.

§1° O Mestrado de Ciências da Reabilitação visa qualificar o pós-graduando para a docência em nível superior;

§2° O Doutorado em Ciências da Reabilitação visa qualificar o pós-graduando para a docência e atividades de investigação científica e inovação tecnológica, preparando-o para o desenvolvimento independente de pesquisas nas Ciências da Reabilitação e qualificando-o para a formação de recursos humanos em nível de Mestrado e de Doutorado. Administração

Art. 2º O Programa será administrado por:

I - o Conselho do Programa;

II - a Comissão Coordenadora do Programa de Pós-graduação (CCPG);

III - o Coordenador e o Vice Coordenador.

Art. 3º O Conselho deverá ser constituído por professores permanentes e colaboradores do Programa e por dois representantes do corpo discente, regularmente Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 2/10 matriculados, um em nível Mestrado e um em nível Doutorado, eleitos entre seus pares, por um período de 2 (dois) anos.

Art. 4º Compete ao Conselho:

I - eleger os membros da CCPG;

II - propor à CCPG medidas visando aprimorar o bom funcionamento do Programa;

III - propor modificações do Regulamento vigente.

§1° As reuniões do Conselho do Programa podem ser convocadas pelo coordenador do PPG, ou por 1/3 dos seus membros, com antecedência mínima de 3 (três) dias úteis. A cada ano deverá ocorrer ao menos uma reunião.

§2° O quórum das reuniões deverá corresponder, no mínimo, a 50% dos docentes mais 01 (um) em primeira convocação, ou por um mínimo de cinco docentes em segunda convocação, quinze minutos após a primeira convocação.

Art. 5º A CCPG é o órgão executivo de deliberações referentes à organização e funcionamento do Programa.

Art. 6º O Coordenador e o Vice Coordenador serão eleitos entre os professores permanentes do Programa de Ciências da Reabilitação (de acordo com o regimento da Universidade).

§1º O Coordenador presidirá a CCPG, sendo as reuniões da CCPG convocadas pelo mesmo ou por metade de seus membros.

§2º O mandato do Coordenador e do Vice Coordenador será de dois anos, podendo haver uma reeleição para o mesmo cargo.

Art. 7º A CCPG será constituída pelo Coordenador, pelo Vice Coordenador, por até dois professores permanentes, representantes de cada uma das linhas de pesquisa do Programa, eleitos pelo Conselho de Professores, e dois representantes discentes, eleitos por seus pares.

§1º Em caso de empate na eleição dos membros da CCPG, será obedecido o seguinte critério de desempate: a) intenção e disponibilidade em participar; b) maior tempo de atuação no Programa; c) maior produção científica, segundo critérios da área 21 da CAPES; d) ser bolsista de produtividade do CNPq, respeitando-se o nível.

§2º Uma vaga adicional poderá ser ocupada pelo Coordenador ou Vice Coordenador da comissão anterior, desde que manifestado interesse por escrito.
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Art. 8º Compete à CCPG:

I - elaborar o Regulamento do Programa e encaminhá-lo às instâncias competentes;

II - elaborar editais dos processos seletivos;

III - elaborar o calendário anual do Programa e definir o número de vagas oferecidas;

IV - estabelecer o conjunto de disciplinas a ser oferecido pelo Programa e aprovar as ementas das mesmas;

V - definir critérios de ingresso e permanência no PPG, e aprovar o ingresso dos docentes no Programa;

VI - atribuir créditos às disciplinas oferecidas;

VII - conferir créditos para disciplinas realizadas em outros programas da UFCSPA ou de outras instituições;

VIII - aprovar os nomes indicados pelo orientador para a composição das bancas examinadoras das dissertações de Mestrado e teses de Doutorado;

IX - homologar os resultados das avaliações das bancas examinadoras;

X - propor convênios com outras instituições;

XI - propor modificações no Regulamento do Programa;

XII - exercer outras atribuições que lhe forem delegadas, dentro de sua área de atuação;

XIII - analisar e aprovar a solicitação de verbas, a distribuição de bolsas e a gestão financeira do Programa. Parágrafo único. Em período de eleição, a CCPG indicará uma comissão eleitoral. A comissão será composta por três membros: um representante docente, um representante discente e o secretário do Programa. Essa comissão conduzirá o processo eleitoral para a eleição dos integrantes da nova Comissão Coordenadora.

Art. 9º Compete ao Coordenador:

I - integrar os Conselhos superiores da UFCSPA;

II - executar as diretrizes emanadas de instâncias superiores;

III - divulgar e acompanhar a execução das decisões da CCPG;

IV - convocar e presidir a CCPG e o Conselho do Programa;

V - promover as articulações da CCPG com os diversos órgãos da administração acadêmica; Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 4/10 VI - representar o Programa onde e quando se fizer necessário;

VII - buscar recursos materiais e humanos para aplicação no aprimoramento do Programa, propondo planos específicos à CCPG e aos órgãos superiores da Universidade;

VIII - superintender os serviços administrativos e didáticos;

IX - gerenciar o orçamento e os auxílios recebidos pelo Programa de Pós-graduação;

X - apresentar, anualmente, relatório de atividades do Programa à CCPG;

XI - delegar atribuições a outros membros da CCPG;

XII - promover intercâmbio com outras unidades universitárias, assim como com outras entidades, para que sejam ministrados cursos de interesse do Programa;

XIII - realizar a abertura das apresentações de dissertações e teses ou atribuí-las ao Vice Coordenador ou ao orientador. Parágrafo único. Compete ao Vice Coordenador substituir o Coordenador nos seus impedimentos. Secretaria

Art. 10. À Secretaria geral, órgão executor dos serviços administrativos, compete:

I - manter em dia os assentamentos de todo o pessoal docente, discente e administrativo;

II - informar e processar todos os requerimentos de estudantes matriculados ou candidatos a matrícula;

III - registrar frequência e notas obtidas pelos discentes nas disciplinas;

IV - efetuar matrícula dos discentes;

V - distribuir e arquivar todos os documentos relativos à atividade didática e administrativa;

VI - coletar os elementos e preparar as prestações de contas e relatórios;

VII - organizar e manter atualizada a coleção de leis, portarias, circulares, e outros documentos que regem os cursos de Pós-graduação;

VIII - encaminhar para as bancas avaliadoras as dissertações e teses, e acompanhar a emissão dos pareceres respeitando os prazos estabelecidos pela CCPG;

IX - encaminhar para a Capes, por meio eletrônico, a versão final das dissertações e teses, já contendo as correções e sugestões aceitas feitas pela Banca Examinadora;

X - praticar os demais atos inerentes as atividades da secretaria. Corpo docente

Art. 11. O corpo docente do Programa será constituído por professores e/ou pesquisadores da UFCSPA, bem como de outras instituições nacionais e internacionais que possuam Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 5/10 alta qualificação profissional na especialidade e satisfaçam os requisitos exigidos pelo Conselho Nacional de Educação, definidos pela CCPG e pela CAPES.

Art. 12. A CCPG organizará, periodicamente, a lista dos professores permanentes, dentre os que possuam o grau de Doutor, em atividade plena de pesquisa, preferentemente em regime de trabalho de 40 horas ou dedicação exclusiva.

§1º Constituem critérios para o ingresso e permanência de professores no quadro de orientadores permanentes do Programa a experiência em orientações e/ou coorientações em nível de pós-graduação (Stricto Sensu), e a produção científica regular e qualificada em revistas indexadas, conforme critérios estabelecidos e divulgados pela CCPG no sítio eletrônico do Programa.

§2º Professores descredenciados poderão solicitar recredenciamento mediante cumprimento das condições estabelecidas e divulgadas pela CCPG.

Art. 13. Caberá ao docente do quadro permanente do Programa:

I - ministrar, no mínimo, 30 horas anuais em disciplinas ofertadas ao Programa, como regente ou colaborador;

II - propor projetos de pesquisa a serem desenvolvidos com seus orientandos;

III - submeter à CCPG a nominata das bancas examinadoras de dissertações e teses;

IV - manter currículo lattes atualizado;

V - fornecer, sempre que solicitado, dados à secretaria da pós-graduação para elaboração do relatório CAPES;

VI - concorrer aos editais de fomento à pesquisa e inovação tecnológica;

VII - dedicar-se com carga-horária mínima de 10h semanais às atividades do Programa;

VIII - participar das reuniões quando convocado.

IX - acompanhar e supervisionar todas as atividades desenvolvidas por seus orientados, bem como responsabilizar-se pelo tempo de conclusão do curso. Parágrafo único. Os projetos de pesquisa são de autoria e responsabilidade dos professores orientadores.

Art. 14. O docente orientador poderá desistir de orientar o discente em qualquer época, justificando-se, por escrito, à CCPG.

Art. 15. Compete à CCPG a aprovação da substituição de orientador, podendo essa ser solicitada tanto pelo orientador quanto pelo aluno. Corpo discente

Art. 16. Constituem condições mínimas para inscrição no Processo de Seleção do Programa:

I - apresentação de diploma de Curso Superior (ou documento equivalente) nacional ou estrangeiro;

II - apresentação do histórico escolar e do Curriculum Lattes atualizados. Outra forma de Curriculum Vitae poderá ser aceita para candidatos estrangeiros; Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 6/10

III - apresentação de carta de aceite de orientação por professor do quadro de orientadores permanentes ou colaborador do Programa. Parágrafo único. Os critérios para inscrição dos candidatos aos cursos de Mestrado e de Doutorado obedecerão às normas definidas, as quais serão periodicamente revisadas pela CCPG.

Art. 17. Os candidatos serão selecionados pela CCPG, com base na aprovação em processo seletivo, conforme edital específico.

§1° A matrícula no Programa poderá ser aprovada pela CCPG para início em qualquer época do ano.

§2° A comprovação da conclusão do Mestrado não constitui pré-requisito obrigatório para a realização da seleção para Doutorado. Contudo, é pré-requisito para a matrícula no curso de Doutorado.

§3° A distribuição de bolsas aos candidatos matriculados no Mestrado e no Doutorado será feita mediante edital específico, de acordo com critérios estabelecidos pela CCPG.

Art. 18. O número de vagas será fixado anualmente pela CCPG, seguindo os critérios estabelecidos pela CAPES.

Art. 19. Com a permissão do professor responsável pela disciplina e anuência da CCPG, poderão ser admitidos alunos em disciplinas isoladas, nas seguintes condições:

I - como "aluno especial", obedecendo aos critérios estabelecidos pela PROPPG;

II - como “aluno ouvinte”, sem qualquer outro direito além do de assistir às aulas.

Art. 20. O discente poderá ser desligado do curso nas seguintes condições:

I - por vontade própria mediante documento formal, assinado pelo mesmo e pelo docente orientador, endereçado à CCPG, onde deverá constar a justificativa para o ato;

II - por solicitação do orientador, em qualquer época, mediante justificativa analisada e aprovada pela CCPG;

III - por abandono, ausentando-se por dois semestres letivos consecutivos, ou por três intercalados. Parágrafo único. Caso o discente seja bolsista do Programa de Demanda Social/CAPES será observado o disposto na legislação vigente.

Art. 21. Ao discente é reconhecido o direito de mudar de orientador nos primeiros doze meses a partir de seu ingresso no Programa, mediante requerimento justificado dirigido ao Coordenador do Programa, cabendo à CCPG o julgamento do pedido.

Art. 22. Solicitações de inclusão de professor coorientador devem ser formalmente encaminhadas à CCPG, com justificativa e assinatura do orientador, do aluno e do candidato à coorientador, antes da conclusão de dois terços do período máximo de titulação para cada nível.

Art. 23. A matrícula em disciplinas do PPG-CR será efetuada nas épocas e prazos disponibilizados pela secretaria.

Art. 24. É permitido o trancamento de matrícula nos cursos de Mestrado ou Doutorado, por prazo não superior a doze meses, desde que o discente não tenha ultrapassado dois terços do período máximo de titulação para seu nível. Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 7/10 Parágrafo único. O trancamento corresponderá à plena cessação das atividades e dependerá de justificativa do orientador, a qual deverá ser aprovada pela Comissão Coordenadora. Para reingresso, o discente deverá encaminhar solicitação formal à CCPG, com a concordância do orientador. Regime Didático

Art. 25. As atividades serão realizadas em tempo integral (40 horas semanais de dedicação), de modo que a oferta de disciplinas se dará de acordo com a disponibilidade de horários dos professores do Programa.

Art. 26. A CCPG fixará o conjunto de disciplinas a serem oferecidas. Parágrafo único. A frequência mínima exigida é de 75% nas aulas e nas demais atividades programadas.

Art. 27. O Curso de Mestrado terá duração mínima de 01 e máxima de 02 anos, contados a partir da data de matrícula no Curso.

Art. 28. O Curso de Doutorado terá duração mínima de 02 e máxima de 04 anos, contados a partir da data da matrícula no Curso. Parágrafo único. Em casos excepcionais, devidamente justificados pelo aluno e por seu orientador, a CCPG poderá admitir a alteração dos prazos máximos para obtenção do Grau de Mestre e Doutor.

Art. 29. A integralização do Curso de Mestrado ou de Doutorado será expressa em unidades de crédito, cada uma correspondendo a 15 (quinze) horas de atividades programadas, as quais poderão compreender aulas, seminários, trabalhos de laboratórios ou de campo e outros tipos de estudo.

§1° Para o curso de Mestrado é necessário integralizar 24 (vinte e quatro) créditos em disciplinas, obrigatórias e optativas.

§2º Para o curso de Doutorado é necessário integralizar 36 (trinta e seis) créditos em disciplinas, obrigatórias e optativas.

§3º Para os alunos do Doutorado que cursaram Mestrado no próprio Programa, os créditos do Mestrado poderão ser aceitos, mediante análise da CCPG.

§4º Os alunos do Doutorado que cursaram Mestrado em outro Programa poderão, a critério da CCPG, ter os créditos de disciplinas do Mestrado validados e computados para o Doutorado.

§5º Os créditos de disciplinas poderão ser validados ou computados desde que tenham sido cursados há, no máximo, cinco anos antes da solicitação.

§6º Para se pleitear aproveitamento de créditos, o discente deverá enviar solicitação à CCPG, apresentando certificado devidamente assinado de nota/conceito obtido com o programa/cronograma da disciplina e período de ocorrência, anuência/concordância do orientador quanto ao aproveitamento/relevância da referida disciplina na formação do aluno e descrição sucinta da razão pela qual a disciplina cursada representa conhecimento pertinente à área de investigação/linha de pesquisa do aluno junto ao PPG-CR. A avaliação e o julgamento do pedido serão feitos pela CCPG. Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 8/10

§7º A validação de disciplinas obrigatórias cursadas em outros programas Stricto Sensu poderá ser aprovada pela CCPG desde que apresentem compatibilidade de 80% de conteúdo e carga horária.

Art. 30. Poderão ser conferidos créditos por trabalho publicado com docente do Programa, após a matrícula do aluno no PPG, relacionados à área de concentração e às linhas de pesquisa do Programa, de acordo com os critérios definidos pela CCPG.

Art. 31. As disciplinas que compõem o Programa são divididas em duas categorias: I - disciplinas obrigatórias; II - disciplinas optativas.

Art. 32. Caberá aos professores responsáveis pelas disciplinas, no prazo máximo de 30 dias, após o encerramento do semestre letivo, apresentar as conclusões sobre o rendimento do discente no semestre, utilizando notas de 0 a 10, apuradas em avaliações parciais, gerais e/ou de recuperação.

§1º O discente que houver obtido, em qualquer disciplina, no mínimo nota “7”, fará jus ao número de créditos atribuídos à mesma.

§2º O discente inscrito em uma disciplina e que, por qualquer motivo não tiver condições de comparecer às aulas, deverá solicitar trancamento da matrícula na referida disciplina antes que 1/5 da mesma tenha sido ministrada.

Art. 33. Para obtenção do título de Mestre é necessário:

I - estar matriculado em de nível Mestrado no PPG-CR, pelo menos por dois semestres;

II - ter completado os 24 créditos exigidos;

III - ter realizado período de formação didático-pedagógica junto a uma das disciplinas de graduação, realizado trabalho de pesquisa e cumprido todas as atividades indicadas pelo professor orientador, e aprovadas pela CCPG;

IV - ter sido aprovado em exame de proficiência em língua inglesa;

V - ter sido aprovada a Dissertação de Mestrado pela Banca Examinadora e após, homologada pela CCPG;

VI - entregar a versão eletrônica atualizada da dissertação, após as modificações sugeridas pela banca examinadora. Parágrafo único. O formato da dissertação deverá obedecer ao Manual para Elaboração de Trabalhos Acadêmicos da UFCSPA e às normas dispostas pela CCPG.

Art. 34. Para obtenção do título de Doutor é necessário:

I - estar matriculado em nível de Doutorado no PPG-CR, pelo menos por quatro semestres;

II - ter completado os 36 créditos exigidos;

III - ter realizado trabalho de pesquisa e cumprido todas as atividades indicadas pelo professor orientador e aprovadas pela CCPG;

IV - ter sido aprovado em exame de proficiência em duas línguas estrangeiras, sendo, obrigatoriamente, uma delas a língua inglesa;

V - ter sido aprovado no Exame de Qualificação, realizado de acordo com normas estabelecidas pela CCPG;

VI - ter sido aprovada a Tese de Doutorado pela Banca Examinadora e após, homologada pela CCPG;

VII - entregar a versão eletrônica atualizada da tese, após as modificações sugeridas pela banca examinadora;

VIII - apresentar comprovação de pelo menos 1 (um) trabalho derivado da tese, aceito ou publicado em revista indexada no Information Science Institute (ISI).

§1º O formato da tese deverá obedecer ao Manual para Elaboração de Trabalhos Acadêmicos da UFCSPA e às normas dispostas pela CCPG.

§2º Candidatos estrangeiros deverão apresentar proficiência em língua inglesa e outra língua diferente do seu idioma materno. Julgamento da Dissertação ou Tese

Art. 35. O julgamento da dissertação ou tese, após cumprido o que determina o art. 33 e o art. 34 do presente Regulamento, deverá ser requerido à CCPG.

Art. 36. É de responsabilidade do orientador avaliar se a Dissertação ou a Tese poderá ser encaminhada à Banca Examinadora, bem como determinar a data para esse julgamento.

Art. 37. A avaliação da Dissertação ou da Tese será feita por uma Banca Examinadora, aprovada pela CCPG e composta de acordo com o estabelecido nas normas de defesa pública estabelecidas pela CCPG.

§1º Dissertações de Mestrado deverão ser apresentadas, preferencialmente, na modalidade presencial.

§2º Teses de Doutorado deverão ser apresentadas sempre na modalidade presencial.

§3º As Bancas Examinadoras de Dissertações serão constituídas por 03 membros titulares e 03 suplentes, indicados pelo orientador e aprovados pela CCPG, com título de Doutor, sendo um deles obrigatoriamente do corpo docente do PPG-CR e um obrigatoriamente externo ao PPG-CR.

§4º As Bancas Examinadoras de Teses serão constituídas no mínimo por 03 membros titulares e 03 suplentes, indicados pelo orientador e aprovados pela CCPG, com título de Doutor, sendo um deles obrigatoriamente do corpo docente do PPG-CR, um externo ao PPGCR e outro externo à Universidade.

Art. 38. No julgamento das Dissertações e das Teses, cada examinador expressará o seu julgamento mediante a atribuição de conceitos, de acordo com seguinte a escala de avaliação: A – Excelente B – Bom C – Insuficiente Rua Sarmento Leite, 245 – Centro histórico – 90050-170 – Porto Alegre (RS) – Tel. (51) 3303-8700 – www.ufcspa.edu.br 10/10

§1° Será aprovado o candidato que obtiver níveis A ou B da maioria dos examinadores, fazendo jus aos créditos correspondentes.

§2° Será facultado a cada examinador emitir, juntamente com a atribuição de nível, parecer e sugestões sobre reformulações do texto da dissertação ou tese.

§3° Após a defesa, a Banca Examinadora deverá assinará a Ata de Defesa, da qual deverão constar os pareceres dos membros e o resultado da avaliação.

§4º Caso a Dissertação seja apresentada em formato não presencial, a Dissertação será enviada aos três membros da Banca Examinadora. Os membros da banca deverão emitir seu parecer no prazo máximo de 15 dias úteis, a contar da data de recebimento.

§5º O orientador poderá fazer a abertura da sessão e presidirá a Banca Examinadora, porém não emitirá conceito.

§6º Os pareceres da Banca Examinadora serão divulgados ao final da sessão de apresentação ou defesa.

§7º No caso de insucesso da defesa de dissertação ou tese, a CCPG poderá, mediante proposta justificada da Banca Examinadora, dar oportunidade ao candidato para apresentar novo trabalho, dentro do prazo máximo de 6 (seis) meses.

§8º A defesa será avaliada pela mesma Banca Examinadora, respeitando-se todas as normas para defesa de dissertação ou tese, previstas neste Regulamento. Disposições Transitórias

Art. 39. Este regulamento está sujeito às demais normas existentes e que vierem a ser estabelecidas para a Pós-graduação na Universidade Federal de Ciências da Saúde de Porto Alegre.

Art. 40. Os casos omissos no presente regulamento serão resolvidos pela própria CCPG em primeira instância, pelo Conselho de Professores em segunda instância, e por último, pelos colegiados superiores da Universidade.

Art. 41. Esta resolução entra em vigor nesta data.

Publique-se no Boletim de Serviço.

Porto Alegre, 10 de outubro de 2019.

LUCIA CAMPOS PELLANDA Presidente