The Benefits of Aquatic Therapy in Conjunction with Land-Based Physical Therapy for Rehabilitation after Total Knee Arthroplasty: A Case Series

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Background

Knee osteoarthritis (OA) is the most common joint disorder in older Americans, with a prevalence of about 30% in adults who are greater than 60 years old.[1] Knee OA typically presents as pain and stiffness, which limits someone's daily functional activities. Patients who experience these restrictions typically seek conservative treatment first.[1] If that form of care is unsuccessful then joint replacement surgery is indicated.[1] Total Knee Arthroplasty (TKA) is a safe procedure to reduce pain, correct joint deformities, and improve overall function and quality of life in patients with symptomatic, end-stage knee OA.[2]

Statistically, over a third of adults with knee OA have undergone joint replacement surgery. Rehabilitation is vital to restore knee range of motion, improve single-leg balance for normalized walking, and reduce pain. Researchers have found that utilizing an aquatic medium instead of using the traditional land-based setting is beneficial for patients who have increased pain with bearing weight through the post-surgical limb. The hydrostatic properties decrease the load on the post-operative joint and reduce pain levels allowing for a more tolerated rehabilitation program.

The beneficial effects of aquatic-based therapy after knee replacement surgery have allowed patients with impaired motor function to perform exercises more efficiently. However, there is limited research on the carry-over of combining land-based therapy and aquatic therapy to functional activities of daily living. The purpose of this case-series is to fill the gap of limited research on the topic by examining two patients, with similar demographics, who underwent rehabilitation after TKA.

Methods

RS is a 67-year-old male who received land-based physical therapy only and **AS** is a 74-year-old male who received land-based physical therapy in conjunction with aquatic therapy after TKA. A total of 13 weeks of physical therapy intervention carried out in three phases was designed to address three main outcomes, including 1) knee range of motion, 2) pain, and 3) single-leg balance for normalized walking pattern of the post-surgical knee.

Data collection for this case series was broken down into three pahses to be able to track short term verus long term objective progress. Each phase was a total of 10 visits, which is consistent with Medicare re-evaluation guidelines. The set goals and land-based exercises were the same throughout all phases of care regardless of the treatment environment. Since the aquatic environment off-loads the painful limb it was vital to see if the water impacted objective progress on land. Figure 1 provides a timeline of both patients' rehabilitation processes.

After TKA, RS and AS demonstrated differences in pain level, degrees of available knee range of motion, and functional single leg balance time in their post-operative limb. In order to detect clinical differences within this case-series, the patients' outcomes were compared to their baseline values for each measure.

Results

The results of the three outcomes throughout three phases of care were shown in Figure 2-4. After land-based in conjunction with aquatic physical therapy, **AS**'s knee range of motion improved to 126°, which is beyond the values required for daily functional activities.[3] **AS** had a 75% decrease in the worst pain level, indicating much relief from pain.[4] By the final observation, **AS**'s single-leg stance was 31 seconds, beyond normative values for his age group.[5] **RS** had little to no objective improvements and was far from reaching knee ranges of motion that were of functional values after receiving 13 weeks of land-only physical therapy. The findings suggested that there were positive relationships between the improvements made in knee range of motion, single-leg balance, and reduction in pain when incorporating the properties of the aquatic medium to the traditional land-based rehabilitation process.

Discussion and Conclusion

End-stage knee OA often indicates TKA surgery for a full return to the functional goals. This case-series proves that land-based therapy in conjunction with aquatic therapy led to positive outcomes in regaining functional knee ranges of motion, reducing pain levels, and improving single-leg balance which is necessary for the normalized walking pattern. Being able to utilize the properties of water to unload the post-operative joint allows for carry-over of more functional exercises to be performed in both rehabilitation environments. This allowed **AS** to tolerate more exercises that targeted his functional goals.

Bibliography

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Supporting materials

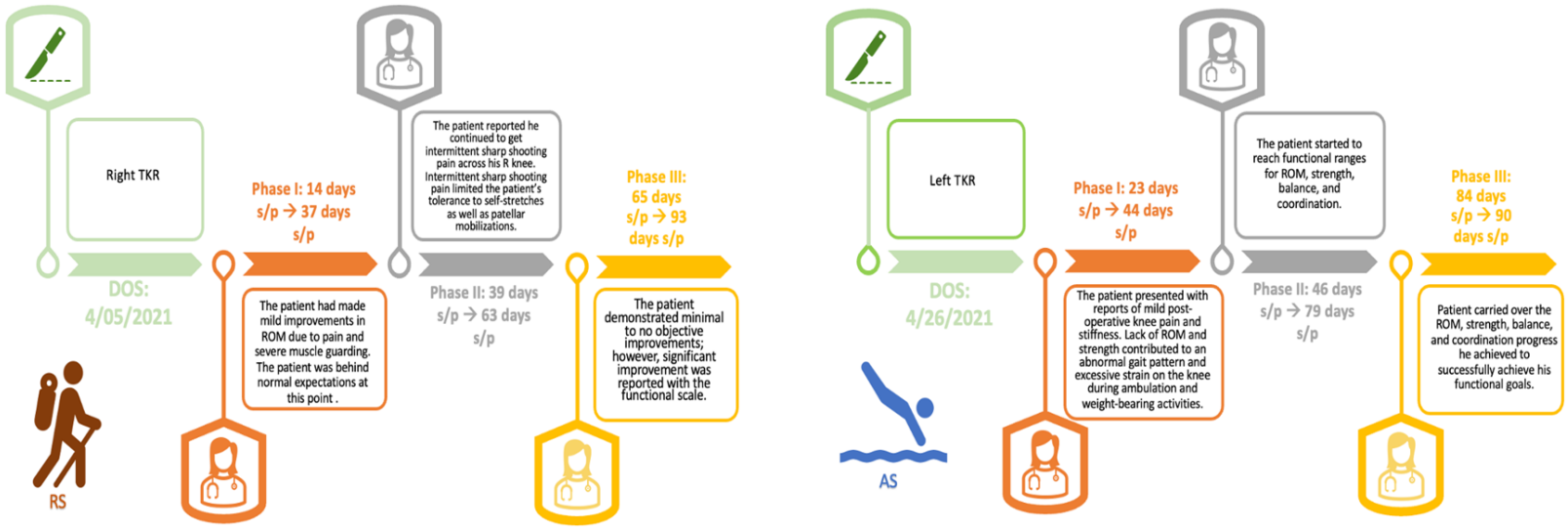

Figure 1. Timeline and Three Phases of Plan of Care in Two Patients (RS and AS).

Note.

1. RS received land-based only physical therapy (Brown Color) while AS received land-based in conjunction with aquatic therapy (Blue Color).
2. DOS = date of surgery; ROM = range of motion

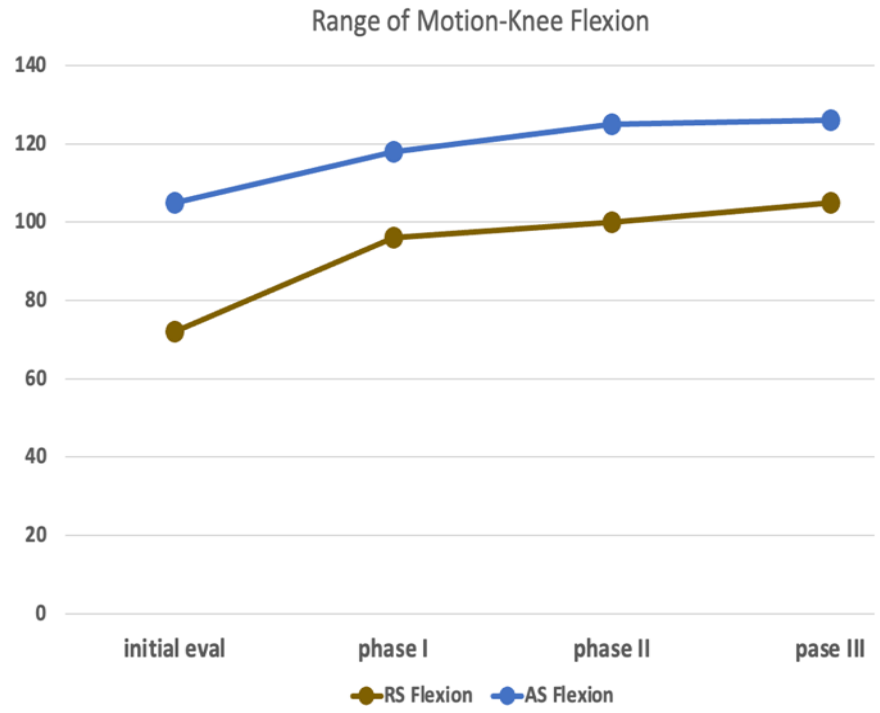

Figure 2. Knee Range of Motion throughout Three Phases of Physical Therapy Intervention.

Note.

1. RS received land-based only physical therapy (Brown/Yellow Color) while AS received land-based in conjunction with aquatic therapy (Blue Color).
2. Higher value is correlated with a better function.

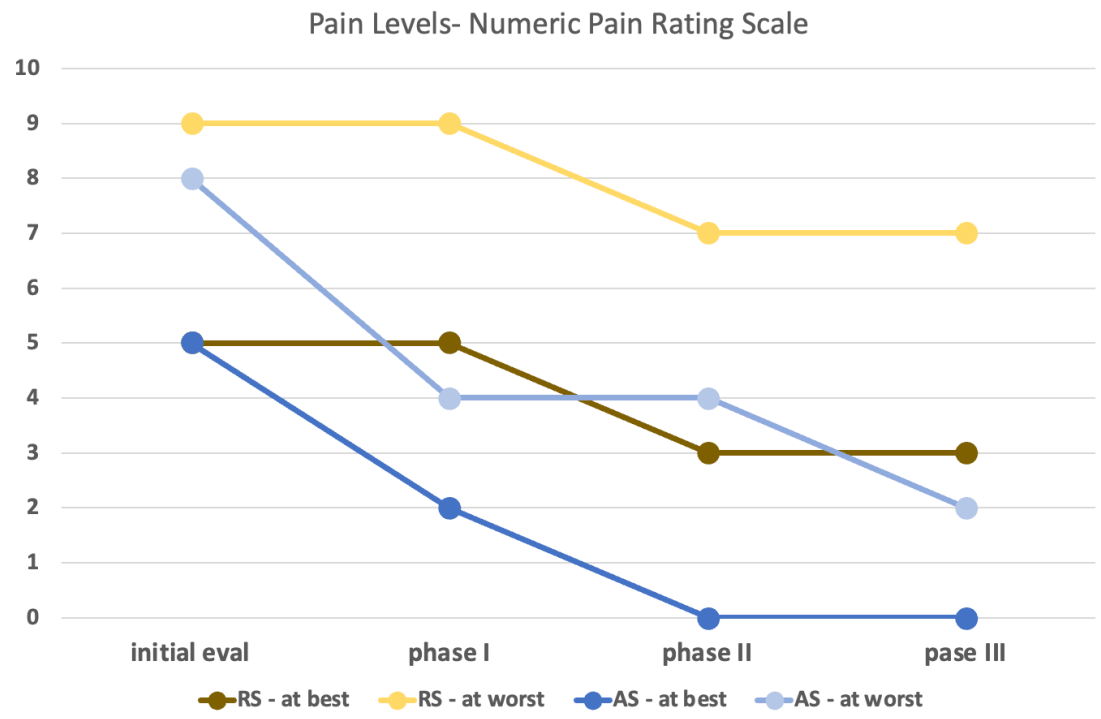

Figure 3. Pain Level throughout Three Phases of Physical Therapy Intervention.

Note.

1. RS received land-based only physical therapy (Brown/Yellow Color) while AS received land-based in conjunction with aquatic therapy (Blue Color).
2. Higher value indicates worse pain

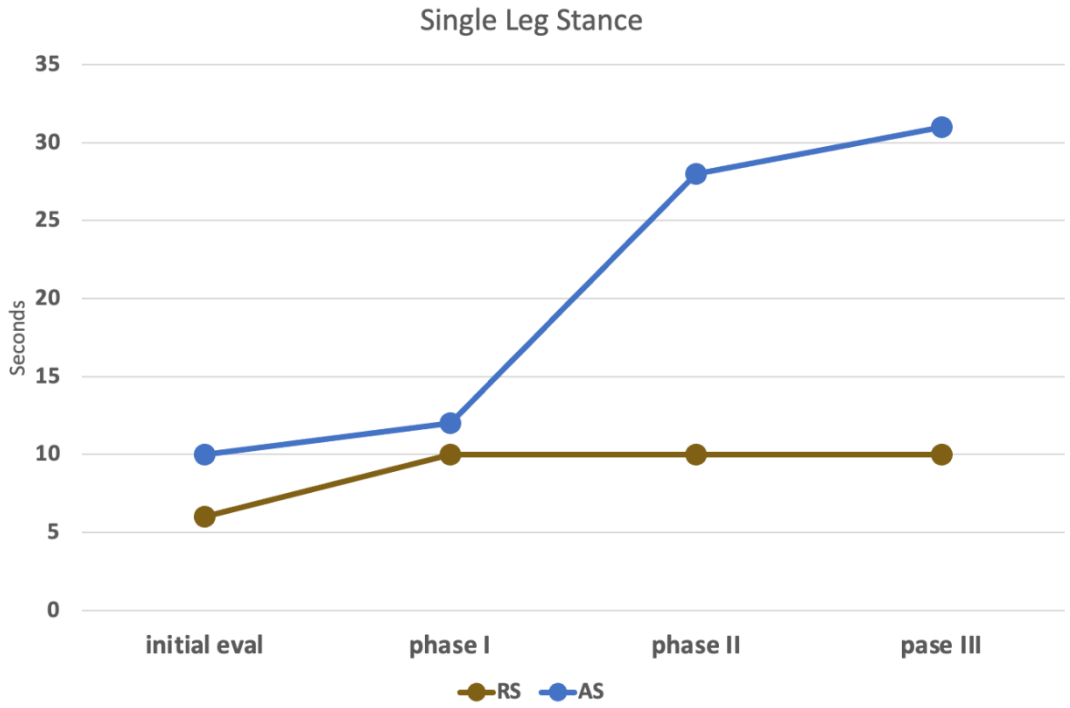

Figure 4. Single-Leg Standing Time throughout Three Phases of Physical Therapy Intervention.

Note.

1. RS received land-based only physical therapy (Brown/Yellow Color) while AS received land-based in conjunction with aquatic therapy (Blue Color).
2. Higher value indicates better balance.