



Patient Satisfaction in the Treatment of Acute Hamstring Strain Injury

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Received: 11-03- 2014

Accepted: 15-04-2014

Published: 31-04-2014

doi: 10.7575/aiac.ijkss.v.2n.2p.9

URL: <http://dx.doi.org/10.7575/aiac.ijkss.v.2n.2p.9>

Abstract

Introduction: The impact of musculoskeletal injuries often caused loss time in sport participation. Athletes who suffered from these injuries experienced a decrease in performance and physical disability. Although a variety of treatments have been implemented to the muscle injuries, the administration of autologous blood injection is replacing the conventional rehabilitation to expedite the process of muscle recovery. Platelet-rich plasma (PRP) is relatively new in muscle injury treatment and there is lack of evidence of the satisfaction of PRP treatment in muscle injuries.

Purposes: The study aimed to investigate the patient satisfaction in the administration of PRP treatment and rehabilitation program for acute hamstring strain injury. **Methods:** Participants (competitive, semi-competitive and recreational athletes) with acute hamstring strain injury (Grade II) were recruited. Participants were randomly divided into either the PRP treatment or rehabilitation program. Participants were required to attend weekly follow up assessment for recovery evaluation. All the participants were required to complete a patient satisfaction questionnaire (PSQ-18) at the end of study. The questionnaire is divided into seven sub-scales: general satisfaction, technical quality, interpersonal manner, communication, financial aspect, time spent with doctor, accessibility and convenience. **Results:** Participants were 22.35 ± 3.41 years. Duration from injury to first presentation in clinic ranged from two to ten days. Mean duration of recovery was 5.64 weeks. No statistically significant difference in the patient satisfaction sub-scales score between the two groups ($p > 0.05$). **Conclusion:** The present study demonstrates that PRP treatment is as satisfactory as conventional rehabilitation program in managing acute hamstring strain injury. Both modalities are correspondingly safe and have high degree of satisfaction. Given the acceptable outcomes, patients are likely to accept PRP as an effective treatment.

Keywords: Sport injuries, rehabilitation, patient satisfaction, blood injection, autologous

1. Introduction

The impact of musculoskeletal injuries is immense and the burden of these injuries is the major cause of loss time in sport participation. Injured athletes suffer in terms of decrease in performance, severe long-term pain and physical disability (Woolf & Pfleger, 2003). Although a variety of treatments have been used in muscle injuries, most of the treatments failed to optimize the muscle healing process (Hamilton, 2012). Since 2004, the autologous blood products became a popular administration to expedite the healing process of muscle injuries (Wright-Carpenter et al., 2004).

Initially, platelet-rich plasma (PRP) was known as the autologous blood product utilized in oral and maxillofacial

surgery in the mid-1990s, and the outcome was positive (Marx, 2004). Subsequently, the use of PRP spreads to the management of other treatments, such as bone, tendon, ligaments, cartilage and muscle. PRP treatment contains high concentration of platelets and growth factors (GFs) (Marx, 2001). Due to this, researchers believed that the administration of PRP is able to enhance recovery of muscle injuries (Halpern, Chaudhury, & Rodeo, 2012; Hamilton, Knez, Eirale, & Chalabi, 2010; Sampson, Gerhardt, & Mandelbaum, 2008). However, PRP is relatively new in muscle injury treatment. Although the administrations of PRP in muscle injuries have shown positive results in enhancing the recovery period (Engelbrechtsen et al., 2010; Wright-Carpenter et al., 2004), there is still a lack of evidence that reflects the satisfaction of PRP treatment in muscle injuries among athletes.

For the past few decades, the assessment of patient satisfaction has been accepted as an important component to determine the quality of medical treatment (Keith, 1998). Ware and colleagues (1976) developed a Patient Satisfaction Questionnaire (PSQ) to evaluate the planning, administration and health services delivery programs where the initial measure was intended to survey in general population. The PSQ was then modified into a short-form version of questionnaire consisting of 18-items (PSQ-18) that measures general satisfaction, technical quality, interpersonal manner, communication, financial aspects, time spent with doctor, accessibility and convenience (Ware Jr., Davies-Avery, & Stewart, 1978). The use of PSQ-18 was recommended as the brevity precludes of the original PSQ (Marshall & Hays, 1994).

The level of patient satisfaction is considered as an overall perception towards the treatment provided (Keith, 1998). It is important that the satisfaction level results could suggest the healthcare provider to make improvement on the treatment provided (Rubin, 1990). Evidence showed that patients who are satisfied with the medical care provided are more likely to cooperate with the treatment that has been provided (Pascoe, 1983). Furthermore, highly satisfied medical treatment is often recognized as an ideal treatment while low level of satisfaction may be a barrier to future utilization (Keith, 1998).

In a recent study, Karimi and colleagues (2013) have showed that an autologous blood injection in the treatment of tennis elbow on 29 patients had achieved a high level of satisfaction. Similarly, the administration of PRP in a small pool of chronic tendinopathy had also achieved high degree of satisfaction (Mautner et al., 2013). Therefore, patient satisfaction survey is important to assess the PRP treatment process and outcome before it is comprehensively recommended for the treatment of muscle injuries.

This study is aimed to investigate patient satisfaction in the administration of PRP treatment and rehabilitation program for acute hamstring strain injury.

2. Methods

2.1 Recruitment of participants

Twenty-two participants were recruited from the sport medicine clinic of University of Malaya Medical Centre (UMMC), Kuala Lumpur, Malaysia. Participants included competitive, semi-competitive and recreational athletes. Inclusion criteria for the study were Grade II acute hamstring strain injury and aged above 18 years old. Exclusion criteria were participants who received other type of treatment at the same time and were unable to participate in follow up assessment.

The degree of injury was confirmed by clinical assessment and ultrasound scan. Written informed consent was obtained from participants at the beginning of the study. Participants were randomly assigned to receive either the PRP treatment or rehabilitation program. The clinical study obtained approval from the UMMC medical ethics committee (MEC Ref No.: 907.25).

2.1 Platelet-Rich Plasma (PRP) treatment group

Participants were treated with a single injection of PRP. The PRP filtration system (Biologic GPS Biomet) was used to produce the therapeutic PRP. A total of 55ml of blood was withdrawn from the participants' antecubital vein. Blood was spun at 3200 rpm for 15 minutes to produce the layers of platelet-poor plasma (PPP), PRP and red-blood cell (RBC). Approximately 3ml of therapeutic PRP was obtained and injected into the injured hamstring region through ultrasound guidance (MS, Mohamed Ali, Yusof, & George, 2012). The injection was performed by an experienced sport physician.

After the injection, participants were advised to rest by limiting their activities for the next 48 hours and apply ice treatment if pain persisted. The adapted home-based stretching and strengthening exercises were prescribed by the sport physiotherapists and the participants were recommended to practice it daily (Table 1) (MS et al., 2012).

Table 1. Stretching and Strengthening Exercises

Exercises	Sets	Duration (seconds)
1. Sidestepping	3	60
2. Grapevine stepping	3	60
3. Single-leg stand progressing from eyes open to eyes closed	4	20

4. Abdominal body bridge (Prone, supine and side)	4	20
5. Ice treatment while in long-sitting position	-	20

2.2 Rehabilitation program group

Participants underwent a set of rehabilitation program which consisted of therapeutic ultrasound (15 minutes), cold therapy (20 minutes), daily unsupervised strengthening and staged range of motion (ROM) exercises (Table 2). The rehabilitation program was adapted based on Sherry and Best (2004). However, the program was prescribed and monitored by experienced sport physiotherapists and a sport physician from the sport medicine clinic of UMMC.

Participants in both the PRP treatment and rehabilitation program groups were prohibited from any strenuous activity that involves the injured muscle groups. They were also required to attend the weekly follow up assessment for recovery evaluation until the day they were allowed to return to their respective sport activities.

Table 2. Stretching and Staged Range of Motion Exercises

Exercises	Sets	Duration (seconds)
1. Sidestepping	3	60
2. Grapevine stepping	3	60
3. Single-leg stand progressing from eyes open to eyes closed	4	20
4. Abdominal body bridge (Prone, supine and side)	4	20
5. Proprioceptive neuromuscular facilitation trunk pull-downs with Thera-Band	2 x 15 reps	-
6. Fast feet in place	4	20
7. Symptoms-free practice	-	-
8. Ice treatment if any symptom of pain persists	-	20

2.3 Patient satisfaction questionnaire (PSQ-18) assessment

This assessment was performed at the end of the study where the participants were required to answer a set of PSQ-18 (Marshall & Hays, 1994) before they were discharged and allowed to return to their respective sport activities.

The PSQ-18 assesses the outcome of the quality of medical care provided in the treatments. Participants were asked how they felt about the medical care they received in general, with no reference to a specific time frame. Responses to each item were given on a 5 point Likert scale ranging from strongly agrees to strongly disagree. High scores indicated optimal satisfaction with the medical care while low scores reflected dissatisfaction with medical care.

The patient satisfaction questionnaire was categorized into seven sub-scales, which are the general satisfaction (items 3 and 7), technical quality (items 2, 4, 6 and 14), interpersonal manner (items 10 and 11), communication (items 1 and 13), financial aspect (items 5 and 7), time spent with doctor (items 12 and 15), accessibility and convenient (items 8, 9, 16 and 18), respectively. Items from the same sub-scales were averaged to obtain the scores for each of the sub-scales.

2.4 Translation of PSQ-18

The questionnaire was translated into Malay and linguistically validated according to international guidelines (Pascoe, 1983). The linguistic validation of the translated instrument was based on the originality and cultural acceptance of the country. The translation was done by using forward and back translations by independent translators.

3. Statistical Analysis

Data analyses were performed by using the IBM SPSS Statistic version 22.0 and Microsoft Excel 2010. Test of normality was performed. Mann-Whitney U test was used to evaluate the data. The analysis were two-tailed with the probability value was determined at less than 0.05 ($p < 0.05$).

4. Results

Fourteen participants (22.35 ± 3.41 years old) participated at the study held in sport medicine clinic of University of Malaya Medical Centre (UMMC), Kuala Lumpur, Malaysia. It was found that the sport-related causes of hamstring strain injury recruited were soccer (42.9%), athletics (21.5%), hockey (14.3%), basketball (7.1%), tennis (7.1%) and rugby (7.1%). The time from injury to first presentation in the clinic ranged from two to ten days. The mean duration of

recovery was 5.64 weeks.

Calculations of the overall scores of PSQ-18 showed that patients have a high degree of satisfaction. The total mean score for patient satisfaction was higher in the rehabilitation program group compared the PRP treatment group (Table 3) ($p>0.05$). The majority of participants (71.43%) were highly satisfied with the medical care provided (>4 -point in average of sub-scale score). The results of PRP group are summarized in Figure 1 and the results of the rehabilitation program group are summarized in Figure 2.

Table 3. Total Mean (SD) Value for Each Group of Scale

	PRP Treatment group	Rehabilitation program group
PSQ-18 patient satisfaction, mean (SD)	4.15 (0.57)	4.4 (0.58)

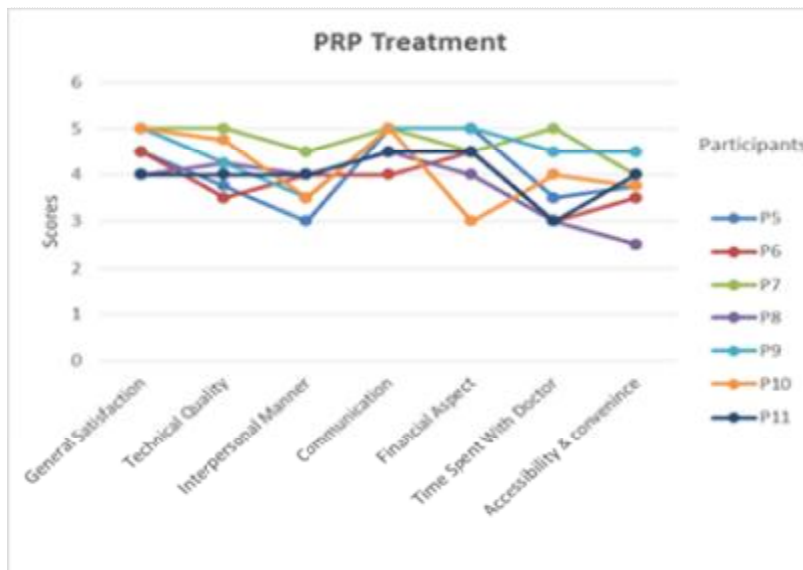


Figure 1. PSQ-18 assessment of PRP treatment group

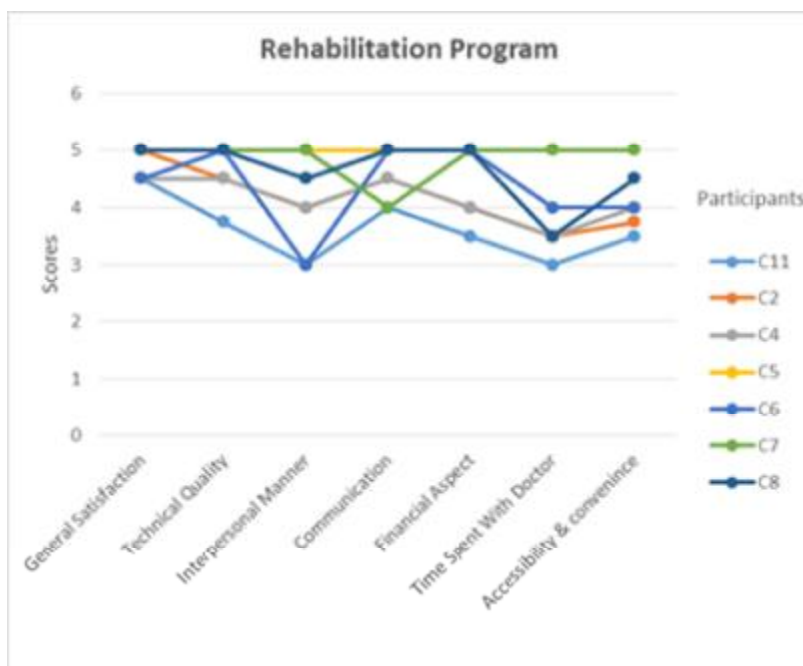


Figure 2. PSQ-18 assessment of rehabilitation program group

The PRP treatment group results showed that the score of patient satisfaction in each category as: general satisfaction (91.4%), technical quality (84.2%), interpersonal manner (75.8%), communication (94.2%), financial aspect (87.2%), time spent with doctor (74.2%) and accessibility and convenience (74.2%). Meanwhile, the rehabilitation program

group indicated that the score of patient satisfaction in each category as: general satisfaction (95.8%), technical quality (93.6%), interpersonal manner (81.4%), communication (91.4%), financial aspect (90%), time spent with doctor (78.6%) and accessibility and convenience (85%) (Figure 3).

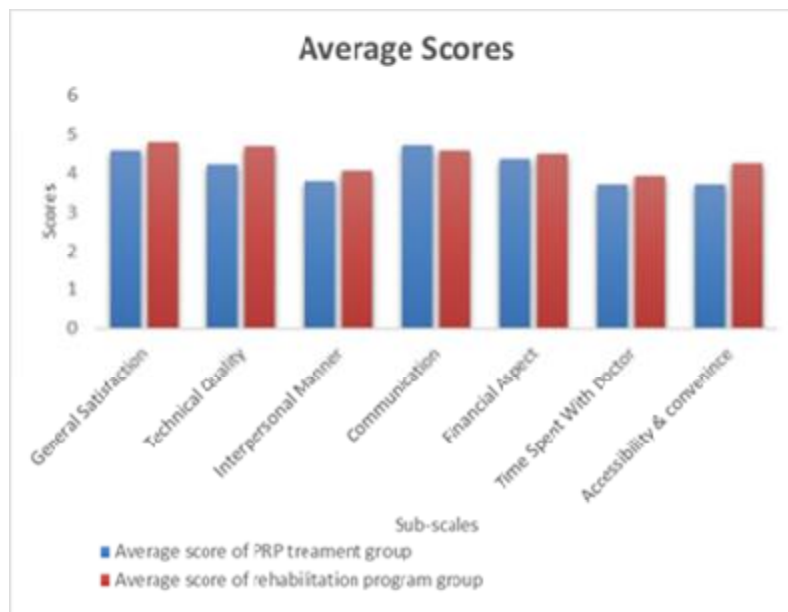


Figure 3. Average sub-scale score of PRP treatment group and rehabilitation program group

However, there was no statistically significant difference between the PRP treatment group and rehabilitation program group in each sub-scales scores, where the p value of each category is: general satisfaction ($P=0.362$), technical quality ($P=0.088$), interpersonal manner ($P=0.429$), communication ($P=0.532$), financial aspect ($P=0.638$), time spent with doctor ($P=0.511$), accessibility and convenient ($P=0.171$), respectively.

5. Discussion

In the present study, PSQ-18 has generally indicated the level of patient satisfaction towards the quality of medical care provided in the treatment of acute hamstring strain injury. Participants from both groups showed no significant difference in the satisfaction level toward the treatments. Both the treatments provided have showed comparatively good results for the treatment of acute hamstring strain injury (Grade II).

In overall, participants were comfortable and familiar with both the medical care provided, in which both groups have showed a high degree of general satisfaction. Rehabilitation exercises are the conservative treatment programs that have been extensively practiced to date (Hamilton, 2012). The effectiveness of this treatment has been recognized since the 1980s and it has been proven that this conservative modality has been associated with great recovery of muscle function within days (Reynolds, Noakes, Schweltnus, Windt, & Bowerbank, 1995; Sherry & Best, 2004). Furthermore, the investigation of patient satisfaction towards rehabilitation program in a small sample size of participants has also shown a high degree of satisfaction (Davis & Hobbs, 1989). Meanwhile PRP treatment is considered as an ideal “supplementary” injection treatment in order to enhance the recovery process. PRP is rich in various healing properties and secretory proteins that are able to initiate and accelerate the tissue regeneration process (Marx, 2004). It is a relatively effective treatment compared to the conservative treatment as it is prepared from the participant’s own blood into therapeutic autologous blood product for injection. The positive perception of PRP application also showed that this treatment is generally satisfying for the treatment of acute hamstring strain injury.

Patient satisfaction primarily depends on the judgment of medical care provided to the patients by considering the approach of healthcare providers and interactions (Brislin, 1970). In this study, all the healthcare providers are the experienced professional, such as sport physician, sport physiotherapist and nurse who are warm, friendly, caring and sensitive to patients. In the rehabilitation program, participants had more interactions with the sport physician and sport physiotherapists as the rehabilitation exercises were monitored throughout the assessment. Also, the participants from the rehabilitation program group had more assessments due to longer recovery duration. In the PRP treatment, participants had more interactions with the physician only during the injection and follow-up assessments. However, participants from the PRP treatment group benefited from a shorter recovery duration and hence, the interaction period between the healthcare provider and participants were lesser.

In the competence of healthcare provider with high standard of diagnosis and treatment, participants in the PRP treatment group were able to utilize new technologies such as PRP filtration system and ultrasound guidance during the injection while participants in the rehabilitation program group utilized the latest rehabilitation equipment as well as conventional strengthening exercises during their treatment period. Both of the technical quality provided is equally competent for the treatments.

The financial aspect as well as accessibility and convenience had also obtained a high satisfaction. This is because of the participants recruited in this study were from Kuala Lumpur and Selangor region, areas that are close to UMMC. Meanwhile, treatment provided in this study was funded by the University of Malaya research grant, where the participants were only required to spend for their transportation cost.

However, there are limitations in this study due to the small sample size, socio-demographic variations characteristic such as gender, education level, ethnicity and age were uncategorized. It is noticeable the variance is wider in the study which could be reduced if the subjects were matched by age.

6. Conclusion

In conclusion, the present study demonstrates that the PRP treatment is satisfactory as the conventional rehabilitation program in managing acute hamstring strain injury (Grade II). Both modalities are correspondingly safe and have high degree of satisfaction. Given the acceptable outcomes, patients are likely to accept PRP as an effective treatment. Also, PRP treatment is perceived as a satisfactory, this suggest that there is no need for radical changes in the treatment management as there is no negative perception towards it that may be a barrier in future utilization.

Despite the wide use of patient satisfaction measurement, there is still lack of research done based on patient satisfactory on the autologous blood injection treatment in muscle injuries. Future investigations and recommendations with larger sample size are required in order to determine large effect size in patient satisfaction on PRP treatment in acute muscle injuries. Matching the subjects' age group for the groups' allocation is expected to reduce the variance and in turn may discriminate the findings.

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