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Immediate and Short Term Effect of Combination Physical Therapy and Manual Therapy in Post ACL Reconstruction Surgery Displaced Mal-Alignment of the Joint. An Invivo Clinical Trial

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Abstract- Post ACL Reconstruction surgery displaced mal-alignment of the joint due to re-injury is rare and difficult to treat the condition, especially in young adult and old age when they develop kinesiophobia (fear of pain due to movement) and pain. During this time if re-surgery is not appreciated physical therapy has to play a very important role in the rehabilitation. Combination of different physiotherapy protocols has to be taken into consideration by the well-experienced therapist to show the immediate effect on the pain and other symptoms to build the confidence of the patient during the therapy. In the present study we used the combination of soft tissue myofascial release technique with MT2 blade, mobilization with belt and manual followed by Kinesio tapping to see the immediate effect. Active exercise therapy was included to carry-on the strengthening and to see short-term effect of the entire Physiotherapy protocol. The present study suggested beneficial effects in combination of physiotherapy treatment protocols.

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Abstract- Post ACL Reconstruction surgery displaced mal-alignment of the joint due to re-injury is rare and difficult to treat the condition, especially in young adult and old age when they develop kinesiophobia (fear of pain due to movement) and pain. During this time if re-surgery is not appreciated physical therapy has to play a very important role in the rehabilitation. Combination of different physiotherapy protocols has to be taken into consideration by the well-experienced therapist to show the immediate effect on the pain and other symptoms to build the confidence of the patient during the therapy. In the present study we used the combination of soft tissue myofascial release technique with MT2 blade, mobilization with belt and manual followed by Kinesio tapping to see the immediate effect. Active exercise therapy was included to carry-on the strengthening and to see short-term effect of the entire Physiotherapy protocol. The present study suggested beneficial effects in combination of physiotherapy treatment protocols.

I. Introduction

Anterior cruciate ligament is known to be one of the key structures in the knee and one of the commonest injured or sprained ligament in the body. Not only in sports but it has the highest prevalence in any other normal human being. Most common risk factors seen are due to sudden changing of direction, stopping suddenly, and landing from height or incorrectly jumping and direct contact or collision during any fall[1]. A study done by Hideyuki Koga et al. proposed a new mechanism of injury that believes ACL ruptures take place within the first 40 minutes after initial ground contact. Due to the unchanged hip joint angle at an initial position lateral knee compression causes valgus loading. The anterior force vector causes quadriceps contraction. Displacement of the femur relative to the tibia takes place and the lateral femoral condyle shifts posteriorly due to the joint geometry. Tibia translates anteriorly and rotates internally, thereby resulting in ACL rupture[2].

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Though there have been many recent advances in ACL Reconstruction surgery's and rehabilitation there is less explanation of the same during the re-injure phase and kinesiophobia. A study finding suggested that young patients are at high risk of sustaining a second ACL injury within 24 months after ACLR[3]. Reasons may be many of which age, sex, knee-related confidence, and performance on the triple hop for distance were mentioned as the primary predictors of a second ACL injury[4]. Another study concludes that there is a high prevalence (61.69%) of kinesiophobia in Young adults post ACL reconstruction for 4 to 8 weeks[5]. The second injury after the primary ACL reconstruction and rehabilitation goes under different positioning of the underline structures. Also, it is difficult to reconstruct and rehabilitate again due to more kinesiophobia and pain. Another study suggests diminished knee related quality of life and social reasons or psychological hindrances such as fear of re-injury may influence return to sports or other daily activities[6,7]. In the present study to present the pre influence of kinesiophobia related to re-injury of the knee was recorded by The Tampa Scale of Kinesiophobia (TSK). The same scale was used to see the post influence during and after the treatment. This scale measures patients' fear of movement[8,9].

Combinations of physical therapies have always shown good results than selecting and deciding to go with a one-line treatment. It is the crucial point where the therapist should be highly experienced to detect which structures are injured and need treatment along with how to carry and which all techniques to be include in the therapy with the concern of the patient convenience and financial status. In the present case, patient was also had kinesiophobia along with nerve entrapment which made the decision difficult to build his confidence to cooperate with active and resisted treatments such as weight-bearing exercise and gait training. We so decided to go with Instrument-assisted soft tissue mobilization (IASTM) for stiffness and pain followed by cryotherapy. We used the M2T blade which is a newly designed Instrument-assisted soft tissue mobilization

(IASTM) that is three dimensional analytic and treatment tool, enables clinicians to assess, detect, and treat individuals diagnosed with scar tissue, adhesions, and soft tissue dysfunction[10,11]. Knee mobilization was included with and without mobilization belt as to free the joint range and nerve entrapment. Many studies give different finding why mobilization is so-important in postoperative cases of any joints especially knee joint. One of most is that Joint mobilization may assist in reducing pain and increasing joint range by passive oscillatory movements of small or large amplitude and sustained stretching within the anatomical limits and at different directions[12]. Based on the different literature we also used Kinesio tapping in the study[13]. Applications of Kinesio tapes were to facilitate contraction and increase muscle strength and to maintain the joint space. After the above treatment protocol conservative treatments like stretching, strengthening and biofeedback for gait training were done.

II. Case Report

A 30-year-old male with secondary injury and malalignment of the knee joint structure attended our clinic with primary complain of pain and buckling of the knee. The patient also gave the history of burning sensation in lateral expect of the knee till the mid-upper superior part of the lower leg. On assessment, patient was having limping gait and decreased strength in the affected extremity. The patient had no external injury or exposed area. On special test, patient was positive for Lachman Test, Positive Lateral Pivot Shift and Positive Anterior Drawer test. Patients explained numbness in lateral expect of the knee till the mid-upper superior part of the lower leg. The X-Ray also revealed slight malposition of the primary ACLR screw implant laterally. The slight malposition of the primary ACLR screw implant laterally was causing compression to the common peronial nerve at the sural nerve branch originating at the lateral end of lateral condyle and meniscus over lateral aspect of tibia head leading to numbness, sometime burning sensation and paraesthesia at in lateral expect of the knee till the mid-upper superior part of the lower leg. The patient also complained of the gradual increase in the weakness in the affected leg during walking (mild circumduction gait during walking were noticed).

After informed consent was explained to the patient in his vernacular language and signed by the patient, he was taken into present study. Pre-data were recorded before any enhancement of the treatment. The patient was instructed to thoroughly follow the exercise protocol advised by the therapist and not to undergo any other treatment or medication till study sessions get completed. In the present study, we used outcome measure as visual Analog Scale, pre-treatment video on Gait analysis, areas of diminished sensation and the borders of distribution, lower limb strength.

III. Discussion

The present case is rare and difficult to treat the case as due to the secondary injury to the knee joint there is increase in kinesiophobia and pain along with nerve interruption. A young patient is always scared of any treatment and little cooperative to the active physical therapy. In such cases, patient should be given the confidence to practice independent activity sessions. As we discussed, we found that more the pain more uncomfortable the patient will be at the therapy sessions. Hence the goals of the study were to decrease the pain first along with numbness and then to increase the strength and mobility of the lower limbs followed by gait training.

Fig. 1: MT2 Blade Release

Fig. 2: Mobilization with Belt followed by Kinesio Tapping

In the present study, we used a combination of the different physical therapy techniques to encounter the pain, numbness and joint mobility at the same site as they were related to each other. We used soft tissue release technique with the help of MT2 blade. MT2 blade uses the principal of myofascial release wherein a stretch is applied on the tight fascia that is maintained for 90-120 seconds prove to lengthen the tight fascia. Other studies on MT2 blade have shown beneficial effects at the cellular, level reduction in scar and increase vascular response[14,15]. MT2 blade therapy also releases fascia leading to pain relief. These effects of MT2 were beneficial in our case as to release the

surrounding structures of the knee joint before performing joint mobilization. This therapy gave pain relief and loosened hold on the knee joint and other surrounding structures around it. After MT2 Cryo-therapy was used to reduce if-any soreness caused due to instrument assisted soft tissue muscle relies. We used manual mobilization[16,17] and belt mobilization in combination with knee glides to decrease the compression of the lateral-end of lateral-condyle and meniscus over lateral-aspect of tibia head that was leading to compression of the sural nerve. Immediately after the soft-tissue release patient was asked to seat at the bed end and distraction in downwardly med-line position was applied. This created the space between the lateral end of lateral condyle and meniscus over lateral aspect of tibia head reducing the compression force. A posterior-medial glide in the midplane of the knee join pushed the lower meniscus position with anterio-posterier glide to tibio-femoral joint in such a position that it released the pressure from the common peronial nerve at the origin of sural nerve. This relived the nerve compression with the reduction in pain and burning sensation immediately. In the same position, we applied Kinesio tape to the knee joint to hold the position in place and for other beneficial effects on ACL reconstruction rehabilitation which are widely known[18,19,20].

The above combination of three therapies gave immediate effect on pain reduction and reduction in burning sensation and numbness. The patient was asked to perform some of the active exercises after the manual session for the strengthening of the lower limb. Manual mobilization techniques were continued for 15 sessions alternatively. Exercises were performed on daily bases under the observation of the therapist. Gait training was also started with visual feedback from the 8th day of the session.

IV. Results

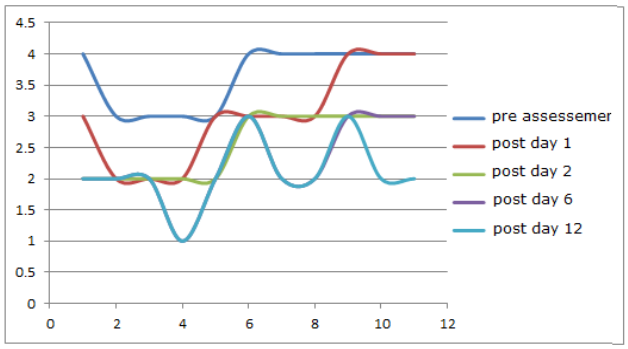

Fig. 3: Tampa Scale-11 (TSK-11) from Pre to Post Day Assessment

Tampa Scale-11 (TSK-11) showed significant changes from pre-assessment to day 1, 2, 6 and 12 depicted in fig 3. The patient was comfortable to walk with the slight pain on day 1 post-treatment as pain reduced form VAS 8 to VAS 5. On the next session, the patient was feeling comfortable and pain-free to do free and light weighted exercises. As the session was regular on daily bases at the 6th session patient was able to walk with a great improvement in his gait pattern. At the 12th session, patient showed significant improvement in walking with no pain and fear of the reoccurrence of reinjures. Burning sensation and paraesthesia at in lateral expect of the knee till the mid-upper superior part of the lower leg also showed a great reduction on the first-day post session. The joint space was maintained by mobilization in an uncompressed position of the sural nerve and prolonged support by Kinesio taping in same position. Relief in nerve entrapment further reduced nerve inflammation. The patient reported less frequent episodes of burning and paraesthesia in from day 2 to day 6 and nil to 1 episode only if done heavy stepping movements. Active exercises with theraband also showed significant improvement in increasing the lower limb strength.

V. Conclusion

A case presented with anatomical, physical as well as psychological conditioning is very-difficult to treat in any type of rehabilitation protocol. If the patient is kinesiophobic or having any other psychological fear it is very difficult to treat, hence careful assessment and gaining of the patient confidence in physical activity or exercise and towards the therapist is of outmost important. In the present case, we decided to relieve the stiffness and pain of the superficial area and then to do mobilization to relive inner compression and stiffness of the joint. This gives confidence to the patient to move the joint and that the therapy will not cause further injury to him. Kinesio tapping was also impotent to support the joint during exercises in correct and uninterrupted pain free position of sural nerve and other structures of the knee joint. Theraband exercises increased the strength in lower limb and biofeedback during gait training was also beneficial.

Conflicts of Interest: All authors declare no conflicts of interest.

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