A PROSPECTIVE STUDY COMPARING THE EFFICACY OF LOCAL INJECTION OF PLATELET-RICH PLASMA VS METHYL PREDNISOLONE IN PLANTAR FASCIITIS

By

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DISSERTATION SUBMITTED TO SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH, KOLAR, KARNATAKA

In partial fulfilment of the requirements for the degree of

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IN

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Under the Guidance of

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Affectionately dedicated to my small world

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Who were, are and will be always with me

To love teach and guide

“Our lives are defined by opportunities, even the ones we miss”

Benjamin Button

LIST OF ABBREVIATIONS

PRP	Platelet-rich plasma
PF	Plantar fasciitis
VAS	Visual Analog Scale
FAI	Foot and Ankle outcome Instrument core scale
AOFAS	American Orthopaedic and Ankle Society ankle- hind foot scale
CSI	Corticosteroid Injection
USV	Ultrasonography Thickness Values
F	Female
M	Male
i.e.	That is
s	Seconds
RCT	Randomized controlled trial
NSAIDS	Non-steroidal anti-inflammatory drugs
CTGF	Connective tissue growth factor
ABI	Autologous Blood Injection
RMS	Roles Maudsley Score
ACP	Autologous Conditioned Plasma
PDGF	Platelet derived growth factor

SD	Standard deviation
WBC	White blood cell
TH1	T helper cells
EMG	Electromyography
Rpm	Rotations per minute

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ABSTRACT

INTRODUCTION:

Plantar fasciitis is among the most common musculo-skeletal problems in Orthopaedic practice. Any heel pain due to persisting plantar fasciitis will often distress the patient, so the right intervention at the right time is needed. Plantar fasciitis is also common in the rural population.

The aim of the study is to evaluate the outcome and the response rate of autologous platelet-rich plasma injection vs corticosteroid (methyl prednisolone) injection in patients with plantar fasciitis. Thus, this study avoids surgical intervention for plantar fasciitis in our rural population of study patients.

OBJECTIVES:

1. To compare the efficacy of local injection of platelet-rich plasma and corticosteroid (methyl prednisolone) in patients with chronic plantar fasciitis.
2. To evaluate safety, side effect and complications of two different modalities of treatment.

MATERIALS AND METHODS:

The study was conducted in the period from August 2018 to September 2020. The study group included one hundred and ten patients of age 18 years and above, with plantar fasciitis persisting for more than three months. The final study was done in one hundred and twenty heels with plantar fasciitis in these one hundred and ten patients after obtaining written consent from them.

The patient characteristics like history of heel pain, gender, age, weight, duration of symptoms and types of prior treatment was noted. Ten patients dropped out during the study. Of the 110 patients, 55 received PRP injection and 55 received CS - 2ml (40 mg) methyl prednisolone with 2 ml of sterile water for injections. With each follow up, clinical, subjective, radiological and functional outcomes were assessed at 1st month, 3rd month and

6th month by using Visual Analog Scale (VAS), Foot and Ankle outcome Instrument core scale (FAI) and Roles Maudsley scores (RMS), American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hind foot scale and Ultrasonogram of plantar fascia thickness.

DISCUSSION:

110 patients were included in this study and 120 painful heels were screened and evaluated in this study. There were ten drop outs in this study. Of the patients' studies, 59 were females and 41 were males. Most of the patients were in the normal weight range of 18.5 to 24.9, mean BMI being 23.6. The mean age group of patients in PRP and CSIs groups was 46.74 ± 12.45 years and 48.5 ± 10.39 years respectively.

The mean VAS value before injection, at 1st month, 3rd month and 6th month in PRP group were 7.32 ± 0.587, 5.78 ± 0.679, 4.52 ± 0.505, 3.5 ± 0.614 respectively. The mean VAS value before injection, at 1st month, 3rd month and 6th month in CS group were 7.24 ± 0.555, 6.46 ± 0.813, 5.64 ± 0.693, 4.44 ± 0.501 respectively. Hence, significant improvement was observed in PRP injection group. Subjective ratings were assessed using Roles Maudsley Score, at the 1st month follow up, Roles Maudsley Score was excellent, good, fair and poor in 10, 16, 20, 4 patients respectively in PRP group and was excellent, good, fair and poor in 17, 17, 10 and 6 patients respectively in the corticosteroid group. At 3rd month follow up, Roles Maudsley Score was excellent, good, fair and poor in 17, 21, 11, 1 patients respectively in the PRP group and was excellent, good, fair and poor in 0, 11, 25 and 14 patients respectively in the corticosteroid group. At the 6th month follow up, Roles Maudsley Score was excellent, good, fair and poor in 32, 13, 0, 5 patients respectively in the PRP group and was excellent, good, fair and poor in 6, 2, 9 and 33 patients respectively in the corticosteroid group.

The mean AOFAS of the subjects in the PRP injections group (pre-injection, 1st month, 3rd month & 6th month) was 59.58, 70.74, 82.20, 92.04 respectively and the mean AOFAS of the subjects in the CSIs group (pre-injection, 1st month, 3rd month & 6th month) was 56.62, 64.08, 71.22, 76.04 respectively. Mean FAI score of the patients in the PRP injections group (pre-injection, 1st month, 3rd month & 6th month) was 100.58, 81.54, 61.86, 41.10 respectively and the mean FAI score of the subjects in the CSIs group (pre-injection, 1st

month, 3rd month & 6th month) was 100.14, 80.84, 73.40, 68.00 respectively. Mean thickness of plantar fascia of the subjects who received PRP injections (pre-injection, 1st month, 3rd month & 6th month) were 6.02, 4.96, 4.02, 3.24 respectively and the mean plantar fascia thickness of the subjects in CSIs group (pre-injection, 1st month, 3rd month & 6th month) were 6.30, 5.28, 5.12, 5.06 respectively.

On comparing the results in both the groups as above, improvement was observed in the PRP group. Two patients had post-operative complications (superficial infection) in PRP injection group, while ten patients had post-operative complications (five patients developed superficial infections, three patients developed skin depigmentation, and two patients had atrophy of fat pad) in CSI group. Infection subsided for patients in both the groups on subsequent follow up.

CONCLUSION:

Our study findings prove that PRP is the good method of management in patients of chronic plantar fasciitis, presenting with some discomfort following activity, with more than three month symptom duration, with VAS score of more than 6 and plantar fascia thickness 5mm and failed conservative management. This is evidenced by comparison of AOFAS, FAI score and Ultrasonogram of plantar fascia thickness before and after the procedure.

This study has shown better results with PRP injection compared with local steroid infiltration. This is the largest case series studied compared to previously available studies in the literature.

PRP injection may be thus used as a superior alternative to the existing treatments for chronic heel pain.

KEY WORDS: plantar fasciitis, platelet-rich plasma, methyl prednisolone

INTRODUCTION

INTRODUCTION

Plantar fasciitis (PF) accounts for 15% of all foot disorders. More than 10% of the population is affected by it over their lifetime.[1-3] Plantar fasciitis is the most common cause of heel pain.[1] The pathophysiology remains poorly understood, but appears similar to Achilles tendinopathy with microscopic degenerative injury and local disruption of the collagen matrix and micro tears, rather than a failed healing response.[2] Plantar fasciitis is one of the common pathological conditions which affect the hind foot and can often be a challenge for clinicians to successfully treat.[1] Plantar fasciitis was originally thought to be an acute inflammatory disease, but histologic findings reflect a chronic degenerative process without inflammation.[2]

Plantar fasciitis is the pain in the inferior heel at the medial band of the plantar fascia attachment, which may be acute or chronic to the medial calcaneal tubercle.[1] Peak incidence of plantar fasciitis occurs between 40 and 60 years of age in both genders. Pain is worst when taking the first few steps out of bed during morning and after periods of rest.[2,3] It is characterized by the sharp pain which is gradual in onset along the medial aspect of the heel. It worsens on the first step taken in the morning or at the beginning of an activity and lessens as the person rests. Plantar fasciitis is diagnosed mainly based on clinical symptoms, such as pain over heel and tightness and diagnostic imaging is not routinely needed.[3] In patients with severe plantar fasciitis, imaging can be useful in confirming the diagnosis and ruling out other musculo-skeletal diseases.[4] The typical imaging findings of plantar fasciitis include calcaneal osteophyte formation (heel spurs) on x-ray and thickened plantar fascia > 4.5 mm on magnetic resonance imaging or ultrasound.[3,5]

Treatment options include rest, ice, stretching, orthoses, giving non-steroidal anti-

inflammatory drugs, Extracorporeal Shock Wave Therapy, injections (corticosteroids, botulinum toxin, dextrose, platelet-rich plasma) and surgery. Nearly 90% of patients recover with non-surgical treatment.[4] It is still undetermined which non-surgical treatment has the best safety and efficacy in treating plantar fasciitis. Release of plantar fascia surgically is rarely performed now, with results variable in efficacy.[6] Corticosteroid injections are given for resistant plantar fasciitis after the failure of conservative non-invasive interventions. They reduce the pain effectively in patients with plantar fasciitis. However, corticosteroid use may be associated with rupture of plantar fascia, infection, skin depigmentation, peripheral nerve injury, muscle damage, post injection flare and fat pad atrophy.

Platelet-rich plasma (PRP) stimulates the healing process in nature by the promotion of platelet growth factors and accelerating the physiological process of healing of the plantar fascia. PRP is plasma enriched with platelets, which can stimulate bone and muscle healing. The tissue repair due to PRP is mediated by different types of cytokines and growth factors.[4] Clinically, PRP is widely used to heal in tendinitis, neural injuries, cardiac muscular injuries, osteoarthritis, oral surgery and plastic surgery.[5] There is substantially growing interest for the usage of growth factor containing plasma for treating various inflammatory condition. So PRP is an alternative treatment for plantar fasciitis to reduce heel pain and to restore function.

This study purpose is to assess the effective and safest option of treatment for plantar fasciitis on the basis of changes in the outcomes by VAS and subjective rating using the Roles Maudsley score, functional outcome score by the Foot and Ankle outcome Instrument (FAI) core scale and the American Orthopaedic and Ankle Society (AOFAS) ankle-hind foot scale. Ultrasonography is used for measuring the plantar fascia thickness on the two different treatment modalities of CSI and PRP injection. Plantar fasciitis along with comorbid conditions like diabetes mellitus and hypertension will be evaluated in this study. This study

finding could translate to a novel approach of handling chronic plantar fasciitis in rural populations.

AIMS & OBJECTIVES

AIMS & OBJECTIVES OF THE STUDY

1. To compare the efficacy of local injection of platelet-rich plasma and corticosteroid (methyl prednisolone) in patients with chronic plantar fasciitis.

2. To evaluate safety, side effect and complications of the two modalities of treatment.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

"The connective tissue of the heel isn't a random blob of collagen, elastin and fat. It's a complex living structure that responds to load. Interactions with the ground as we move subject it to shear (tearing) and compression (squashing) forces. These forces create patterns of strain throughout the collagen/ elastin/ fat network, sculpting the structure of the molecular cross links and alignments within this critical support system".

Kevin Thomas Morgan

HISTORICAL REVIEW

Davis PF et al in 1994 reported that plantar fasciitis pain will subside in 90% of the patients within 18 months.[7] The cushioning from orthoses reduce shock in walking by 42% DeMaio M et al in 1993.[8] In 1997 Gudeman SD et al stated that other local physical therapies like ultrasound, laser therapy, iontophoresis are also used for the treatment of plantar fasciitis. They demonstrated pain relief after 2 weeks of treatment, but no significant difference was noted after 1 month of treatment.[9] In 1998 Martin RL et al treated with a protocol consisting of stretching of plantar fascia, a night splint and a heel cup. 51% of their patients reported complete pain relief.[10]

In 1999, Probe RA et al said that Achilles stretching or night splint would reduce pain and prevent contracture of plantar fascia.[11] Lynch DM et al in 1998 reported that 80% success rate was noted with orthoses, 30% with steroid injections and 33% using NSAIDS.[12,13] Surgical management is advised only when all the conservative therapy fails. Only 5 to 10% cases progress to surgery O'Malley MJ et al in 2000.[14] Few surgical options are removal of calcaneal spur which may also cause heel pain and this modality of treatment was started from early 19th century by classical medial approach just above calcaneum. Other

procedures include medial calcaneal nerve neurectomy to relieve heel pain and release of adhesions.

However, the effectiveness of orthoses in the treatment of plantar fasciitis is still inconclusive Cole C et al in 2005.[15] One clinical randomized study done by Landorf KB et al in 2005 compared results using orthotic treatment. They noted there is no improvement in pain at 12 months with orthoses, but their functional status improved. In 2005 Landorf also stated that custom-made shoe insoles may improve function without significant improvement in pain at three months.[16]

Thompson CE et al in 2005 conducted a study using randomization on the effects of extra corporeal shock wave therapy for plantar fasciitis patients. They stated that this treatment was widely used from the year 1990 and while better pain relief was achieved with this treatment, the duration of treatment was longer. In the present day, many doctors advise life style modifications like strengthening exercises (swimming, cycling), physical therapy as good means to prevent the disease from progressing further.[17] Orthoses such as heel pad and arch support decrease excessive pronation and reduce the biomechanical loading of the foot by Neufeld SK and Cerrato R in 2008.[18]

The complications known to occur after injection of two steroid injections are plantar fascia rupture and steroid induced fat necrosis. The injection of steroid into heel pad can cause mechanical disruption of fibrous septa and fat necrosis with loss of shock-absorbing capabilities. Other treatments like taping and cups are designed to remove stress from plantar fascia and to restore its compression. Orthoses can control pes planus and over pronation. This is useful as pronation may cause plantar fascia pain and orthoses can decrease plantar fascia tension during gait. However, disease regression is slower with orthoses. Another treatment recommended is stretching exercises to stretch plantar fascia and Achilles tendon

for duration 4 to 6 weeks, although it is more helpful in acute cases.[18]

Three placebo-controlled randomized controlled trials have demonstrated that CSIs had superior pain control compared with placebo for plantar fasciitis.[6-8] Plantar fasciitis is known by different names including heel pain syndrome, sub calcaneal pain syndrome, calcaneodynia, sub calcaneal bursitis, calcaneal periostitis, neuritis, heel spur syndrome, sub calcaneal spur syndrome, stone bruise, medial arch sprain, runner's heel, jogger's heel and policeman's heel.[19]

Plantar fasciotomy had been performed since 1930's. Many patients had pain relief in three weeks with removal of the degenerated plantar fascia and spurs, but care needed to be taken not to injure the medial calcaneal nerve. Post-operatively, all cases showed improvement in 3 to 6 months. The surgeons described complications like medial calcaneal nerve injury, heel pad numbness, neuroma formation, delayed wound healing, deep venous thrombosis, superficial and deep infections and iatrogenic calcaneal fracture after spur excision.

EVOLUTION OF PLANTAR FASCIITIS TREATMENT:

In the present day, plantar fasciitis is managed by a conservative approach; with healing occurring in few weeks to 18 months.[20] The methods of treatment used are NSAIDS, low dye taping, heel pads, cups, orthoses, soft soled shoes and night splints. Most of these have limited scientific evidence of their efficacy. In 2003 Crawford F and Thomson CE described stretching programmes to reduce plantar fasciitis symptoms; they increase the flexibility of plantar fascia and recreate the windlass mechanism so that the tissue tension is restored. Stretching may be combined with other treatments such as anti-inflammatory medication, heel cushion, heel cups, injections and rest.[17]

In 2009 Glazer JL pointed out that PRP injections or sclerotic agents are currently being investigated for use in this and other similar conditions. A small group of patients with symptoms may benefit from surgical release of the plantar fascia. Diagnosis and correction of biomechanical factors leading to this condition should be a mainstay of treatment and may prevent recurrences. Correction of gait disturbances, changes in footwear, use of tension night splints and stretching of tight calf and plantar tissues have all be proven to relieve pain.[21]

In 2010 Peerbooms JC et al in their randomized controlled multi-centre trial showed effective treatment of tendinosis with autologous injections of PRP. They noted that forthcoming trial will compare chronic plantar fasciitis treatment with a steroid injection and an autologous platelet injection.[22]

Kampa RJ and Connell DA showed chronic tendinopathies are a common source of disability and can be recalcitrant to conservative measures, which once exhausted may necessitate operative intervention. Blood and platelets, in particular, are a rich source of factors necessary for tissue healing. Autologous blood injections (ABI) are thought to promote tendon healing, but have been explored clinically in only a few limited studies in relation with sports related injuries.[23]

In 2011 Lopez Gavito E et al in a study of non-surgical treatment of Achilles tendinopathies and plantar fasciitis demonstrated good results in up to 90% of cases. However, the management of the remaining 10% proved challenging. New modalities for the development of orthobiologic materials make it possible to use PRP which is an alternative to treat cases that have been resistant to prior treatment and that have a chronicity exceeding 12 months. The usage of PRP in patients with tendinopathy of Achilles tendon and plantar fasciitis is an effective and safe alternative for the treatment of patients who have shown poor response to conventional non-surgical treatment.[24]

In 2011 Soomekh DJ mentioned that PRP injections have been used since the 1970s and have become more popular over the last several years in the treatment of ankle and foot injuries. Platelets produce granules, which release growth factors to promote healing. The results from in vitro and in vivo studies in foot and ankle injuries are promising. The applications for management in the foot and ankle may be broader than once thought.[25]

In 2012 Akashin E et al found that both local PRP injection and corticosteroids were effective in treating plantar fasciitis. When the potential complication of corticosteroid treatment was taken into consideration, PRP injection seems to be safer and at least having same efficacy in plantar fasciitis treatment.[26]

In 2012 Ragab EM and Othman AM demonstrated the efficacy of PRP treatment for chronic plantar fasciitis. PRP injection was found to be safe as it did not affect the biomechanical foot function. Their successful early findings with injection of PRP indicated that it could potentially be a widely-used modality in treating this difficult condition.[27]

In 2013 Chew KT in their randomized trial on plantar fasciitis treatment with autologous plasma or Extracorporeal Shock Wave Therapy plus conventional treatments found improvements in pain and functional outcomes in comparison with conventional treatment. There was insignificant difference between Autologous Conditioned Plasma (ACP) and Extracorporeal Shock Wave Therapy in relation with VAS and AOFAS ankle-hind foot scale improvements, though the ACP group demonstrated greater reductions in plantar fascia thickness.[28] In 2013 Kumar V et al said that while most cases of plantar fasciitis could be managed with existing conservative treatment, a few intractable cases could be difficult to resolve. In these chronic cases, new biologic treatments like PRP produce an efficacy rate, approaching 2 out of every 3. The procedure was safe with no reported complications.[29]

In 2013 Tiwari M and Bhargava R conducted a study on sixty patients to evaluate and to compare the PRP effect and steroid injection on patients with plantar fasciitis. The results at the 1, 3 & 6 months were evaluated, showing good results in those who were given PRP in comparison to steroid injections.[30]

A single-centre, uncontrolled, prospective, preliminary study done in 2013 by Martinelli N et al assessed the safety and preliminary clinical results of PRP injections for the treatment of chronic plantar fasciitis and found that treating chronic plantar fasciitis with PRP injections was safe and demonstrated pain reduction.[31]

In 2013 O Malley MJ et al in their retrospective study documented that the clinical outcomes of patients who were given treatment with PRP injection for plantar fasciitis to determine the degree to which injections can decrease the VAS pain scores and improve patient reported functional scores. Their results provide preliminary information on the safety and efficacy of PRP injection for the treatment of chronic plantar fasciitis.[32]

In 2014 Say et al studied on comparing the difference in the mean VAS between the PRP and the steroid group at the 6^{th} week and 6^{th} month found a statistical significance ($p<0.001$). Changes in AOFAS and VAS scores were significantly higher in the PRP group ($p<0.001$) and they concluded that the PRP is effective in pain control and gave good functional outcomes.[33]

Franceschi F et al in 2014 conducted a systematic review on the effects of PRP in PF. They included prospectively designed studies in humans. Though the usage of PRP in PF showed good results and it appeared to be safe, more randomized placebo-controlled studies which characterized the intervention details and standardized the outcome scores would have helped to better document the responses and optimize the treatment.[34]

In 2014 Shetty VD et al conducted a prospective non-randomized study comparing the efficacy of traditional CSI (steroid group) with PRP injection (PRP group) in a cohort of patients. They analyzed groups of patients before and after giving the injections using VAS, the Foot & Ankle Disability Index (FADI) and AOFAS. Their study concluded that there is clinical improvement in PRP group at three months after giving the injection.[35]

Monto RR 2014 in a prospective randomized comparative series, compared platelet-rich plasma (PRP), a concentrated bioactive blood component rich in cytokines and growth factors, to CSI in the treatment of chronic cases of plantar fasciitis resistant to traditional non-operative management. PRP was more effective than cortisone injection for the treatment of chronic cases of plantar fasciitis.[36]

In 2014, a systematic review done by Sandrey MA evaluated the literature to critically consider the growth factors effects delivered through autologous whole blood and PRP injections in managing wrist-flexor and extensor tendinopathies, plantar fasciopathy and patellar tendinopathy. Strong evidence indicates that growth factor injections did not improve fasciopathy of plantar area pain or function when combined with anesthetic agents on comparison with CSIs, dry needling, or exercise therapy treatments. Furthermore, limited evidence suggests that PRP injections are beneficial. Except for two high-quality RCT studies, the rest were methodologically flawed. Without more studies using proper control groups, randomization, blinding and validated disability outcome measures for pain and function, they declared the results were speculative because autologous whole blood and PRP injection treatments were not standardized.[37]

Vannini F et al in 2014 reviewed all the literature available on the clinical application of PRP in treating foot and ankle pathologies, in understanding its potential and best indications for the clinical usage. The overall evaluation of results reported did not clearly

demonstrate the potential of PRP therapy in the specific fields of application.[38] Andia I and Maffulli N in 2015 proposed a review systematically to identify studies assessing PRP efficacy in tendon and muscle during the past decade. They standardized data extraction by grouping studies based on anatomic location; summarized patient populations, PRP formulations and clinical outcomes; and identified knowledge deficits that require further investigation. Given the heterogeneity in tendons and tendinopathies, they could not decide whether PRP therapies are useful. In spite of advances in PRP science, there was insufficient data and there was a need to optimize protocols and high-quality clinical data needed to be obtained in both tendinopathies and injuries of muscle before making treatment recommendations.[39]

In 2015 Grambart ST conducted a Cochrane review to assess the effects of platelet rich therapies for the treatment of musculo-skeletal injuries. Selection criteria were randomized and quasi-randomized controlled trials were conducted that compared platelet rich therapy with either placebo, autologous whole blood, dry needling, or no platelet rich therapy for people with acute or chronic musculo-skeletal soft tissue injuries. Several in vitro studies showed that growth factors help in regeneration of bone, cartilage and tendons. More clinical studies are needed in evaluation of the use of PRP as an orthobiologic. PRP has a role when conservative treatment has failed and the next treating option is an invasive surgical procedure.[40]

A study done in 2015 by Hsiao MY et al included seven randomized controlled trials and three quasi-experimental studies where 604 patients were enrolled. Pair-wise meta-analysis indicated a trend favoring Autologous Blood Products over CSIs with regard to VAS reduction at 3 months; this benefit was significant in a subgroup analysis of PRP vs CSIs. There was no significant between group differences considering VAS reduction at 6 months and in treatment success.[41]

An analysis done by Zhang JY et al on PRP therapy's efficacy assessed current utilization of PRP as a biologic treating option for musculo-skeletal injuries and conditions through a descriptive epidemiology study. Most treated patients were older than 35 years and the commonly treated conditions included cartilage and meniscus disorders. They recommended application of this treatment for musculo-skeletal injuries.[42]

In 2016, a systematic literature search was conducted by Assad S et al from 2010 to 2016 where they included eight randomized controlled trails. Extracorporeal shock wave lithotripsy (ESWL) with botulinum toxin type A, CSIs, autologous whole blood and plasma treatment, novel treatments like cryopreserved human amniotic membrane, effect of placebo, PRP injections and CSIs, physiotherapy and high strength training were analyzed. All the treatment modalities applied lead to reduction in pain scores, but in the long term autologous plasma and PRP showed better results.[43]

A research was conducted in electronic databases on 2016 by Chiew SK et al, the study was aimed to systematically review the effectiveness of PRP treatment in managing PF. Amount of collected blood, types of blood anti-coagulant, methods in preparing PRP, speed and numbers of time the blood samples were centrifuged, activating PRP's added agent and techniques of injection varied between different studies. They observed that PRP therapy might be considered as an alternative to conservative management of PF with no obvious side effect or complications. The onset of action after PRP injection also greatly depended on degree of degeneration.[44]

In 2016 Gogna P et al did a study that showed the treatment methods are numerous with none proving to be clearly superior to others. It compared PRP and low dose radiation. At the time of final follow up (6 months) the improvement in the pain score VAS, American Orthopaedic Foot and Ankle Score (AOFAS) and thickness of plantar fascia on ultrasound

were compared. Significant improvement in all three parameters was noted at the time of final follow up within both the groups. On comparison with each other, difference in outcome of both these groups PRP and low dose radiation in sports persons on the given three parameters came out to be insignificant ($p>0.05$).[45]

The study by Vahdatpour B et al in 2016 compared intralesional injection of autologous blood derived products - PRP and whole blood (WB) for treating chronic PF. Significant improvement of pain and function and decrease in thickness plantar fascia, was observed by intralesional PRP injection and whole blood in chronic PF. The study results indicate similar effectiveness between PRP and WB for treating chronic PF in short term.[46] Vahdatpour B et al in their single-blind randomized controlled trial found significant improvement in pain severity and limitation in patients with plantar fasciitis with PRP. This healing effect may start at least three months after injection.[47]

Tsikopoulos K et al did a systematic review and meta-analysis to compare the effectiveness of autologous whole blood with CSIs on epicondylopathy and plantar fasciopathy. They showed corticosteroids were marginally superior to autologous whole blood in relieving pain on plantar fasciopathy at 2-6 weeks. Autologous whole blood provided significant clinical relief on epicondylopathy at 8-24 weeks. Conclusions were limited by the bias.[48] In 2016 Mahindra P et al showed there was no significantly improving VAS or AOFAS in the placebo group. They concluded that local PRP injection or corticosteroid is an effective treatment option for chronic plantar fasciitis. PRP injection is more effective than CSI in treating chronic plantar fasciitis.[49]

Acosta – Olivo C et al conducted a blinded study with randomization in 2017, compared intralesional steroids with PRP, using evaluation of pain and functional scales, in patients with plantar fasciitis who were not responding to conservative treatment. They

decided that the PRP usage is an effective treatment method for patients with plantar fasciitis who are not responding to conservative treatment because PRP demonstrates an efficacy equal to that of steroids. However, the cost and the time for preparation of PRP are two of the disadvantages of this treatment.[50]

Singh P et al in 2017 conducted a systematic review and meta- analysis to determine whether injections of PRP are associated with improved pain and function scores on comparing CSI for plantar fasciopathy. PRP injections are associated with improvement in pain and function scores at third month follow up on comparison with CSIs. Information regarding relative adverse event rates and cost implications is lacking. Further, large-scale, high-quality, randomized controlled trials with blinding of outcome assessment and longer follow up are required.[51] A meta-analysis of randomized controlled trials done in 2017 by Yang WY et al included nine RCTs (n=430). They found PRP injections a suitable therapy for plantar fasciitis (PF) to reduce pain over the heel and improve in restoration of function.[52]

David JA et al done a Cochrane database systematic review in 2017 assessed trials of CSIs in the treatment of pain over plantar heel in adults. Low quality evidence was found that local steroid injections on comparison with placebo or no treatment may slightly reduce heel pain up to one month but not subsequently. The available evidence for other outcomes of this comparison was very low quality. Where available, the evidence from comparisons of steroid injections with other interventions used to treat pain over heel and and different methods of guiding the injection was also very low quality. Although serious adverse events relating to steroid injection were rare, these were under reported and a higher risk cannot be ruled out. Further research should focus on establishing the effects (benefits and harms) of injected steroids on comparison with placebo in typical clinical settings, subsequent to unsuccessful conservative therapy. Ideally, this should be preceded by research, including patient

involvement, aimed to obtain consensus on the priority questions for the treatment of plantar heel pain.[53]

Gonnade N et al in their prospective randomized pilot study compared the regenerating efficacy of PRP vs kinesiotaping with phonophoresis in patients who were resistant to the management of PF conservatively. The study concluded that therapeutic quality autologous PRP injection ($1x10^6$ platelets /μl) has regenerative effect with long and better efficacy in management of pain in chronic plantar fasciitis than phonophoresis and kinesiotaping.[54]

Ugurlar M et al in his study comparing the therapeutic effects of Extracorporeal Shock Wave Therapy and injection of PRP with local CSI and prolotherapy for treating chronic plantar fasciitis. The CSI was effective in the first three months and Extracorporeal Shock Wave Therapy was the treatment method which was effective in the first six months with regard to pain. The effectiveness of CSI was lost during the follow up period. The prolotherapy effect and PRP effect was seen within 3 to 12 months; however, at the 36 month follow up point, there were no differences found among the four treatments.[55]

In 2018, Li H et al studied the pain relief performance of eight different plantar fasciitis therapies, including non-steroidal anti-inflammatory medications, CSs, autologous whole blood, PRP, ESWT, ultrasound therapy (US), botulinum toxin A (BTX-A). CSs were significantly better on comparison with placebo in three month results. With regard to six months VAS results, ESWT performed better than placebo. ESWT ranked the first as for all seven outcomes. ESWT might be the optimal treatment. In addition, BTX-A and PRP were considered as suboptimal.[56]

In 2018, a meta-analysis done by Ling Y and Wang S compared the effects of PRP and other treatment modalities in patients with plantar fasciitis. PRP was as superior as other

treatments in reduction of pain and improvement of function in patients diagnosed with plantar fasciitis. Subgroup analysis indicated that PRP showed greater effect than steroid in AOFAS and its effect was durable in the long term. However, considering the potential limitations in the study, more studies are needed to confirm the findings.[57]

Johnson Lynn S et al conducted a feasibility study of PRP versus saline for treating plantar fasciitis. Patients with six months or more of magnetic resonance imaging proven plantar fasciitis, who had failed treatment conservatively, were invited for participation in the study. There was no correlation between preoperative pain in VAS. Recruitment and loss to follow up rates were relatively high. Both treatments resulted in a similar, significant, improvement in symptoms.[58]

In their 2019 study, Soraganvi P et al made a conclusion that local injection of PRP is an effective treating option for chronic plantar fasciitis on comparison with steroid injection with long lasting beneficial effect. They observed improving scores of VAS and AOFAS were significant statistically. At the end of six months follow up, thickness of plantar fascia shows reduction in both groups (PRP and CSIs) [5.78mm to 3.35mm in group A (PRP) and 5.6mm to 3.75mm in group B (CSI)] and the difference was significant statistically. Mean VAS in group A decreased from 7.14 before injection to 1.41 after injection and in group B decreased from 7.21 before injection to 1.93 after injection, at final follow up. Mean AOFAS in group A improved from 54 to 90.03 and in group B from 55.63 to 74.67 at six months follow up.[59]

A 2019 systematic review and meta- analysis indicated PRP, is an alternative to traditional CS, useful in treating elbow epicondylitis (EE) and plantar fasciitis. PRP yields statistically and clinically better improvement in long-term pain than does CS in the treatment of EE. The usage of PRP yields statistically and clinically better long term

functional improvement than that of CS.[60]

Peerbooms JC et al made a study that showed for non- operative treatment option of chronic plantar fasciitis; often a corticosteroid injection is given. Corticosteroid injection reduces pain temporarily but no healing. PRP has proven to be a safe therapeutic option in the treatment of tendon, muscle, bone and cartilage injuries. The PRP group showed significantly lower Foot Functional Index Disability scores and significantly lower pain scores at the one year follow up. Treatment of patients with chronic plantar fasciitis with PRP reduces pain and increase function more as compared with the effect of corticosteroid injection.[61]

Whittaker GA published a systemic review that showed corticosteroid injection is used for plantar heel pain frequently (plantar fasciitis), Therefore, this study reviewed randomized trials to estimate the effectiveness of corticosteroid injection for pain over plantar heel. On the basis of the findings, corticosteroid injection is effective than comparators for the pain reduction and the improving the function in people with heel pain. However, corticosteroid injection is not effective compared to placebo injection for pain reduction or function improvement. Further trials that are of low risk of bias will strengthen this evidence.[62]

Malahias MA et al in 2019 conducted a study to compare the effectiveness of a single ultrasound (US)-guided PRP versus PPP (Platelet Poor Plasma) injection in patients with chronic plantar fasciitis. Both treatments provided improvement significantly at three and six month follow up after the injection was conducted for comparing the effectiveness of a single ultrasound (US)-guided PRP versus PPP injection in patients diagnosed with chronic plantar fasciitis.[63]

Chen Y J et al in 2019 conducted systematic review of autologous blood derived product compared to corticosteroids for treating plantar fasciopathy. Twelve trials and four quasi-experimental studies were included. Corticosteroids reduced pain more effectively than whole blood at 1.5 and 3 months, but the effect disappeared at 6 months. PRP reduced pain more effectively at 6 months post injection than corticosteroids. This meta-analysis suggested that PRP may provide a long-term effect in reducing pain in plantar fasciopathy patients.[64]

A single-blinded, clinical trial done by Tabrizi A et al in 2020 showed exposures, total morning pain and foot function index were not significant statistically different at baseline; however after 24 weeks of treatment, final pain and morning pain scores were significant statistically ($p < 0.001$) in the corticosteroid group and the mean foot function index scores were ($p < 0.001$) in patients treated with corticosteroid and PRP, respectively. In obese patients with plantar fasciitis, injection with corticosteroid was more effective than PRP in reduction of pain and improvement of function.[65]

Tseng WC et al in 2020 did a meta-analysis on corticosteroids vs autologous blood derived products for plantar fasciitis. It is the first meta-analysis that includes only randomized controlled trials. Their meta-analysis showed insignificant difference between corticosteroids and autologous blood derived products, as measured by VAS or American Orthopedic Foot and Ankle Scores. These findings were applicable whether followed up in short, intermediate or long term. The results differed from previous studies that showed autologous blood-derived products to be superior to corticosteroids during the long term follow up.[66]

ANATOMY

FUNCTIONAL ANATOMY OF FOOT

Human foot is composed of 28 bones and 33 joints. They are structured into four segments.[67] They are:

1. Rear foot (tarsus)
2. Mid foot (lesser tarsus)
3. Fore foot (metatarsus)
4. Phalanges.

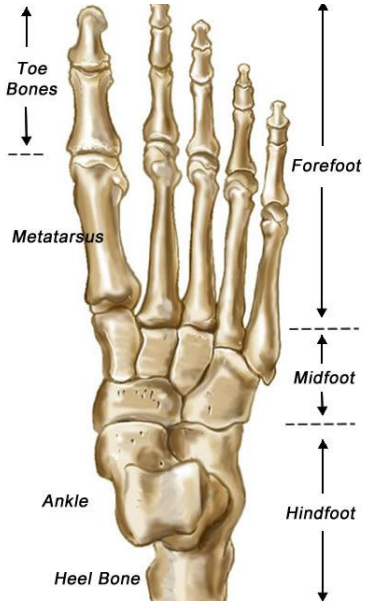


FIGURE 1: FOOT SKELETON[43] This figures shows bones and segments of healthy human foot.

For functioning of the foot, three arches are important. They are medial longitudinal arch, lateral arch and transverse metatarsal arch. The medial longitudinal arch is the largest and

most functionally important of all the three arches. Bones that constitute the medial arch are talus, navicular, calcaneus, three cuneiforms and three metatarsals.

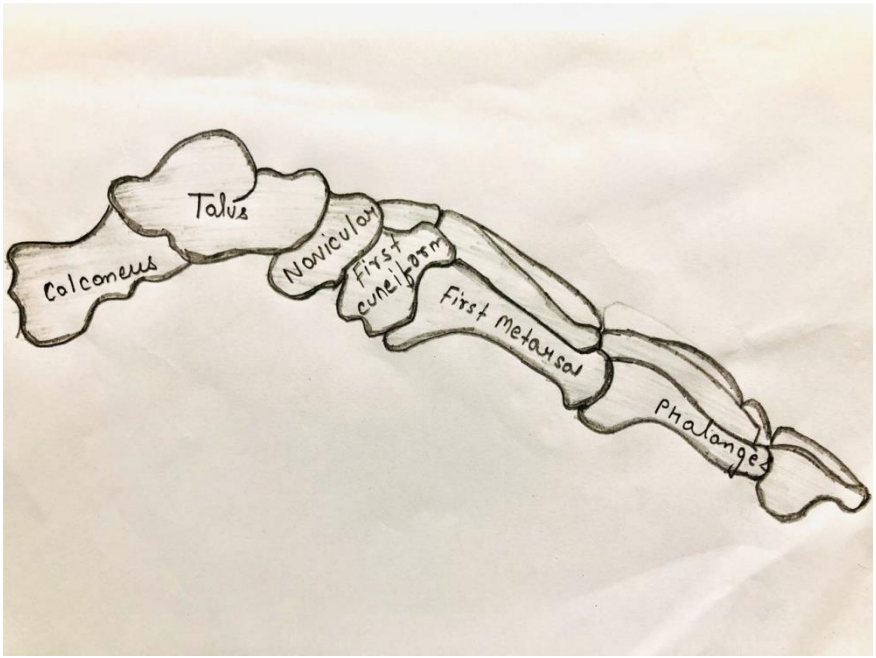


FIGURE 2: THE BONES OF THE MEDIAL LONGITUDINAL ARCH[43]

This figure shows medial longitudinal arch. It is supported by the Calcaneus (heel bone) Talus (ankle bone) Navicular (top of the arch with the Talus) three Cuneiforms (small square shaped bones forming the mid foot) and the first three Metatarsals (which also contribute to the transverse arch of the foot).

ARCH - FOOT MUSCLES

INTRINSIC MUSCLES ARE:

The plantar fascia surrounds the medial and inferior portion of medial compartment. The inferior portion of central compartment is surrounded by plantar fascia. The lateral compartment is surrounded by fascia inferiorly and laterally. Its important role is the maintenance of the medial arch.

The compartments are

Medial compartment: Abductor hallucis, Flexor hallucis brevis

Central compartment: Flexor digitorum brevis, Adductor hallucis

Lateral compartment: Abductor digiti minimi, Flexor digiti minimi brevis

Fourth Interosseous compartment:

7 interossei, Interosseous fascia, Metatarsals.

Few studies stated that when the intrinsic muscles are fatigued, there would be decrease in medial arch height.[68]

FIGURE 3 : INTRINSIC MUSCLES OF THE FOOT.[69]

Plantar intrinsics: Layer 1: 1 = abductor hallucis, 2 = flexor digitorum brevis, 3 = abductor digiti minimi; Layer 2: 4 = quadratus plantae, 5 = lumbricals 1-4; Layer 3: 6 = flexor digiti minimi, 7a = adductor hallucis oblique head, 7b = adductor hallucis transverse head, 8 = flexor hallucis brevis; Layer 4: dorsal interossei dorsal intrinsics: 10 = dorsal interossei, 11 = extensor digitorum brevis.

EXTRINSIC MUSCLES:

Tibialis posterior is the important muscle which support the medial arch.[70] The medial arch will be affected in cases of dysfunctional or rupture of tibialis posterior muscle.

Innervation:

It is supplied by posterior tibial nerve, which gives rise to medial calcaneal nerve at the medial malleoli, which pierces flexor retinaculum and innervate medial aspect of heel. Sural nerve gives rise to the lateral calcaneal nerve at the lateral malleoli levels which innervate lateral aspect of foot.

The tendons posterior tibialis, flexor digitorum longus, flexor hallucis longus and peroneus longus brevis act as force transducers.

- Plantar loads up to 700 neutons, the significant arch is maintained in dorsiflexion of toes.
- The stiffness of arch depends on short and long plantar ligament.[60]

FUNCTIONAL ANATOMY OF PLANTAR FASCIA

The plantar fascia is a connective tissue of fibrous band, originating from the plantar surface of medial tubercle of calcaneus. It is composed of three major bands: medial, central, lateral. Of these, the thinner medial and lateral segments run distally and coalesce with fibers of central segment to form the origins of intra muscular septa. The central is the strongest and the thickest of the three.

The plantar fascia is a passive contributor of medial longitudinal arch.[71] The central segment courses distally and at the metatarsal base levels, separates into five slips that attach to the plantar plates of each of the arch. Its surgical release will lower the medial longitudinal arch.[72]

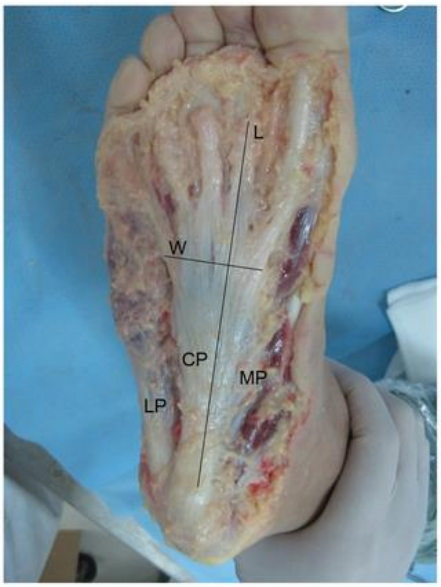


FIGURE 4 : AXIAL VIEW OF THE PLANTAR APONEUROSIS.[73] LP, lateral part; CP, central part; MP, medial part; L, length; W, width.

The orientation of fibers of plantar fascia is mainly longitudinal, while some fibers are transverse. The medial and lateral borders over intrinsic muscles of hallux and fifth toe, while the central part overlies the long and short flexor are of digits. At the medial process of calcaneal tuberosity attachment it is narrow posteriorly. The attachment of fascia is proximal to flexor digitorum brevis at the level of medial calcaneal tuberosity attachment. The fascia while traced distally it becomes broader and thinner and at the metatarsal heads level it divides into five bands one for each toe. These five bands diverge below the metatarsal shafts and attaches to the proximal plantar and little distal to the metatarsal heads and their joints, they are all united by transverse bands. The medial band of aponeurosis covering abductor hallucis is thin. It continues proximally with flexor retinaculum, medially with the fascia of dorsalis pedis, laterally with the plantar aponeurosis. The lateral band covers abductor digiti minimi which is thin distally and thick proximally. It continues medially with the central part of aponeurosis.[43]

BIOMECHANICS OF PLANTAR FASCIA

Plantar aponeurosis helps in the maintenance of the longitudinal arch of the foot.

WINDLASS MECHANISM

During the extension of metatarsophalangeal joints, the plantar fascia becomes taut, causing the height of the arch to increase, the rear foot to re-supinate and the foot to become a rigid lever, then causing propulsion.[74] The *windlass* model is the theory on the relationship with the plantar fascia, toe dorsiflexion are medial arch kinematics.[72] In this model, the foot is represented by two rigid beam segments resembling the rear foot and the forefoot. Plantar fascia, metatarsal head and proximal phalanx were modeled as a cable, a windlass drum and a drum handle. The higher arch is always associated with stable foot. Strength and tension of plantar fascia when the windlass mechanism is engaged, causes the toes to dorsiflex.

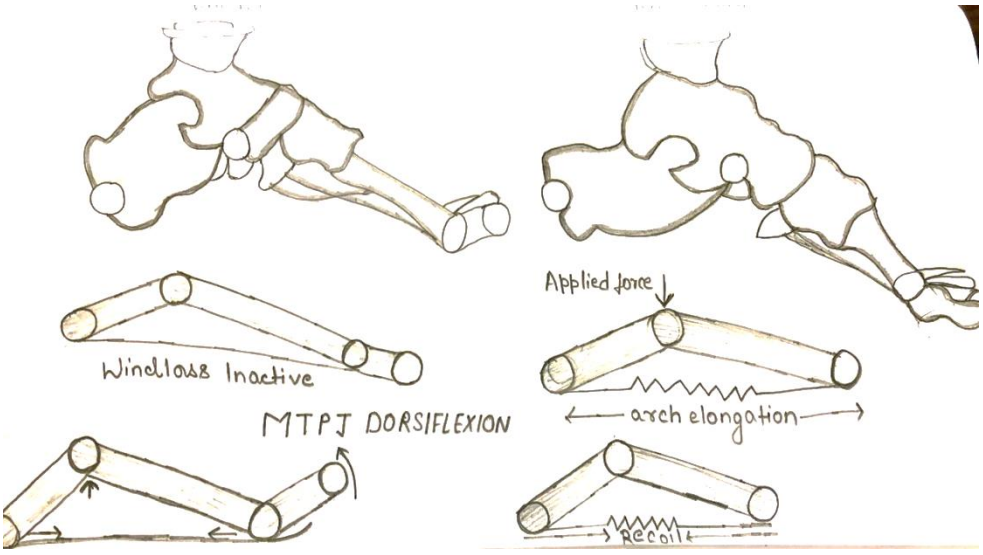


FIGURE 5: WINDLASS MECHANISM[72]

This figure shows Windlass mechanism. It is a mechanical model that describes the manner which plantar fascia supports the foot during weight-bearing activities and provides information regarding the biomechanical stresses placed on plantar fascia.

- The foot's architecture resembles a roman arch. It protects against lateral movements of both ends.[75]

- Shear load of flat joint surfaces is avoided in the architecture of foot's arch and it helps in gait when the heel is lifted from the floor at push off.[76]

The function of the human foot is described dichotomously as a compliant structure during mid-stance and a stiff lever during push-off. The arch-spring and the windlass mechanisms, respectively, describe each of these behaviors; however, their interaction was not quantified to date. By engaging the windlass mechanism with metatarsophalangeal joint (MTPJ) dorsiflexion, there is stiffening of the arch and reduced energy absorption and dissipation during dynamic compression of foot. When the windlass mechanism is engaged, the arch elongated more and absorbed and dissipated more energy than during non-engagement. This engagement of windlass altered the rotational axis of the mid-foot, which probably oriented the arch-spanning structures closer to their resting length, increasing their compliance. This provides novel evidence for interplay between the windlass and arch-spring mechanisms that aids in regulation of energy storage within the foot.

PLANTAR FASCIITIS

Plantar fasciitis is an age related condition. Its treatment consumes time. It is a limiting condition with symptoms persist for 18 to 36 months.[43] There is sub-calcaneal level pain in plantar fasciitis. It should be differentiated from local inflammatory conditions like sub calcaneal heel pain syndrome, periostitis, painful heel pad, sub calcaneal bursitis, tenosynovitis (flexor hallucis longus, flexor digitorum longus) calcaneal apophysitis (sever's disease) and systemic causes like seronegative spondyloarthropathies, ankylosing spondylitis, reiter's syndrome, psoriatic arthritis, Behcet syndrome, rheumatic arthritis, gouty and pseudo gouty arthritis. Other causes of similar pain include atrophy of fat pad, calcaneal spurs and

other neurological conditions.

The different names given by different authors is because of the confusion about the etiology of plantar fasciitis.[77] Most authors in their studies stated that successful management of plantar fasciitis usually requires combined treatment modalities, rather than administering single treatment at a time.[78] It is stated that interventions that are mechanical, in combination with any other treatment, would relieve heel pain to the maximum extent, but there are studies which show that mechanical intervention is not of much significance. The mechanical treatment modalities such as foot taping, foot orthoses, footwear, night splints, rest and walking casts are capable of reduction of the load and stress to the plantar fascia which is inflamed to a level which is tolerable.[79] Plantar fasciitis is the degeneration of plantar fascia resulting from repetitive trauma at its origin on the calcaneus. Plantar fasciitis causes pain in heel in both active and sedentary adults of all ages.[80]

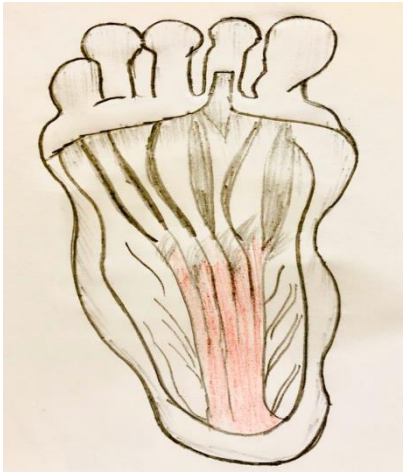


FIGURE NO 6 : PLANTAR FASCIITIS[71] This figure shows an inflamed plantar fascia.

Plantar fasciitis is often called “heel spur syndrome,” although this terminology is confusing to clinicians because 15 to 25% of general population without symptoms have heel spurs and half among them with plantar fasciitis do not have heel spurs.[71] Heel spur is a bony osteophyte located at the calcaneal tubercle’s medial process and any greater pull of the

plantar fascia will lead to periosteal hemorrhage and inflammatory reaction and will lay a new bone which will lead to spur formation which may be asymptomatic in nature.[71] Literature says that heel spur is more often associated with flexor digitorum brevis muscle rather than plantar fascia.

Differential diagnosis includes plantar fascia rupture, inflammatory rheumatologic conditions, tumors, nerve entrapment, tarsal tunnel syndrome, calcaneal stress fracture, fat pad atrophy, sub calcaneal bursitis and calcaneal periostitis. Acute heel or arch pain suggests plantar fascia rupture, especially following athletic activity. Bilateral symptoms could represent a manifestation of an inflammatory disorder. In younger patients with plantar fasciitis on both sides we should rule out inflammatory disorders like rheumatoid arthritis, spondylitis, reiter's syndrome.[77] Any older patient with bilateral plantar fasciitis might have gout or osteomalacia, pain in these cases are not relieved by conservative means. Nocturnal pain should raise the suspicion of various causes of heel pain like inflammatory disorders, tumors and neuropathic pain including entrapment of nerve and tarsal tunnel syndrome.

Pain over the heel was recently reported in involvement of the nerve to abductor digiti minimi, which supplies a motor branch to the abductor digiti minimi and sensory branches to the periosteum and plantar fascia. In 20% of cases of inferior heel pain, the pain is caused by this nerve being trapped or affected due to inflammation of the plantar fascia.[21] Tenderness of the heel during mediolateral compression (squeeze test) should lead to a suspicion of a stress fracture of calcaneus. Tenderness over the posterior part of the heel may be due to the heel pad atrophy, sub calcaneal bursitis or calcaneal periostitis.

To rule out other causes many clinicians prefer stress views x-rays with weight bearing (antero-posterior and lateral) to rule out stress fractures of calcaneus, tumors, rheumatoid arthritis changes in calcaneum or erosions due to sub calcaneal bursitis.

Positive percussion tinel sign over the medial side of the heel should raise suspicion of entrapment of nerve to abductor digiti minimi or a tarsal tunnel syndrome. Complete blood count with erythrocyte sedimentation rate is done in patients to rule out inflammatory disorders in atypical type.[77]

The best method to diagnose is by clinical presentation with pain and tenderness in the medial tubercle of the calcaneus on the heel.[18] Plantar fasciitis is a self-limiting disease. With conservative treatment like stretching exercises, it may take 8 to 12 weeks duration for healing acute cases of plantar fasciitis.[43]

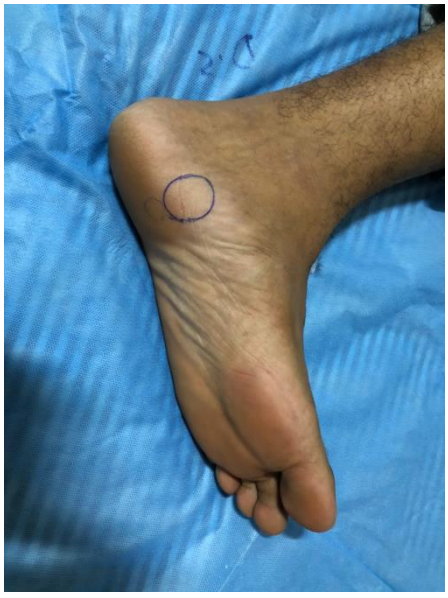
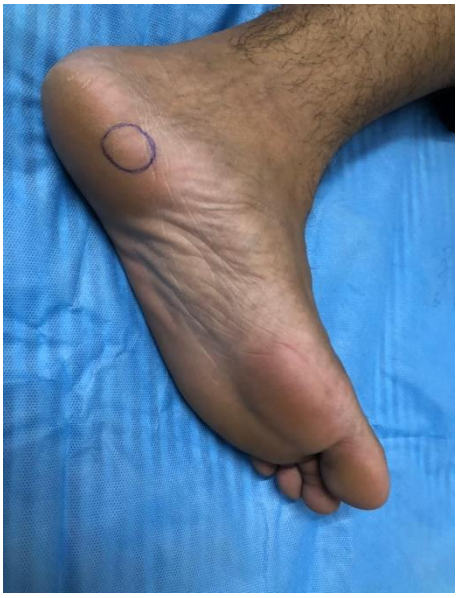
A.  B. 

FIGURE 7: PLANTAR FASCIITIS PAIN A. MEDIAL PLANTAR HEEL TENDERNESS B. MAXIMUM POINT OF TENDERNESS (pain is elicited when pressure is applied during physical examination).

Plantar fasciitis is an inflammatory disease at an acute stage. With mechanical overload, it can lead to chronic inflammation and degenerative changes.[81] Plantar fasciitis accounts for about 11 to 15% of all foot problems in adults, it peaks between 40 and 60 years of age and in younger age group in runners. The predominance of this condition according to sex varies from one study to other.[15,18] The most common site of abnormality is adjacent to

the origin of plantar aponeurosis at the medial aspect of plantar tubercle of the calcaneus.[18]

Due to the various causes of plantar fasciitis, the treating options are also varied: using NSAIDS, night splints, low dye taping, heel pads, cups, orthoses and steroid injection. Extra corporeal shock wave therapy is used in the recent years to treat this disease. With life style modifications only 5 to 10% of people have needed surgical intervention like removal of calcaneal spur, neurectomy, and plantar fasciotomy.[82]

The advantage of PRP for the therapy of plantar fasciitis in recent times is due to its advantages with early recovery of pain levels and improved functional activities of the patient when compared with above mentioned treatments.

- Bilateral presentation of plantar fasciitis was reported in 4 to 30% of the patients.
- The causes of heel pain which should be ruled out include those which cause the limp and referred pain from calf, knee or hip.
- There are many causes of heel pain which may present secondary to local and systemic disorders.[82]
- The tenderness because of plantar fasciitis heel pain is due to maximal strain on the plantar fascia, which results in fascial and perifascial inflammation, micro tears and plantar fascia fibrosis at the site of origin.[83]
- Some studies have reported that changes in plantar fascia are collagen degeneration angioplastic hyperplasia, chondroid metaplasia, matrix calcification.[84]

  The findings contribute to incomplete healing and repair, chronic inflammation and fatigue failure of plantar fascia.

In addition to multiple causes of plantar heel pain, pathology with many causes has no valid evidence of any particular cause.[85]

- An anatomic study found that plantar spur is located at the short flexor tendon origin not at the origin of plantar fascia as initially thought by our elders.[86]

- So study says that it is not the spur that causes pain over heel but may be by inflammation or any nerve entrapment.

- Another study done in USA shows that 73% of people with pain over heel had radio-graphic evidence of calcaneal hyperostosis.

- Routine x-rays antero-posterior, medial oblique are done for all patients to rule out the absence or presence of spur and also to assist in ruling out less frequent causes of heel pain such as calcaneal cyst, foreign body, bony tumor, osteomyelitis or stress fracture. The horizontal orientation of spur is usually noted from the calcaneal tuberosity.[87]

- The MRI study shows that the plantar fascia thickness is increased to 7.40mm to 7.56mm in symptomatic patients, whereas the asymptomatic patients thickness vary from 3mm to 4mm.[88]

- Using ultrasonography, symptomatic patients had significant increase in plantar fascia thickness, with inflammatory changes and thickness of greater than 4mm or more. A routine lateral foot radiography may demonstrate distortion of soft tissue planes or periostitis.[89]

- In chronic plantar fasciitis cases, with the traction exostosis of medial calcaneal tuberosity, a calcaneal spur may form.

- The soft tissues inferior to the medial tuberosity or calcaneal spur when thickened and inflamed are responsible for pain. Soft tissues calcification inferior to spur is also responsible for pain.

ETIOLOGY OF PLANTAR FASCIITIS

The cause of plantar fasciitis is still exactly unknown although several factors are implicated. The variety of treatments used for plantar fasciitis treatment is due to the unknown etiology and pathogenesis of the disease. The causative factors are discussed under three headings.[77]

ANATOMIC FACTORS:

These include pes planus, pes cavus, obesity, limb length discrepancy and shortened Achilles tendon.

BIOMECHANICAL FACTORS:

These include weak plantar flexors, eqinus, weakness of the intrinsic muscles of foot, excessive sub talar pronation, poor foot wear and limited dorsiflexion.

ENVIRONMENTAL FACTORS:

These include trauma, hard surface prolonged weight bearing, inadequate stretching and limited ankle dorsiflexion.

In most cases, it is a combination of all these factors that are involved in the development of plantar fasciitis. Many authors have noted that abnormal anatomic foot configurations can contribute to plantar fasciitis. For instance, pes planus with excessive pronation is a common mechanical cause of development of this disease in around 80 to 86% of patients. Here, increased pronation leads to decreased hind foot stability, causing further plantar fascia strain, which will eventually cause plantar fasciitis. The heel pronation

increases the tension along the heel's medial aspect, which results in instability of foot to supinate from mid to terminal stance. Some of the load is borne by the bones and ligaments along the mid foot, with the excess load being laid on plantar fascia.[89]

Few authors have noted that cavus foot is one of the causes for plantar fasciitis due to shifting of vertical load from mid foot to forefoot resulting in tightness of plantar fascia during stance phase.[90] A tight Achilles tendon and the lower limb external rotation deformity will cause increase in load on the foot mainly over the intrinsic muscles of foot during stance phase, which can cause plantar fasciitis due restriction of supination in almost 78% of patients.

Overuse of the heel, obesity and improper foot wear are established causes for plantar fasciitis. The obesity was associated with plantar fasciitis in 40% males and 80% females. In our society, improper foot wear in low socio-economic status patients is also causative.[82]

PATHOLOGY OF PLANTAR FASCIITIS

An injury to the tissue's medial border at the origin of calcaneus may occur initially.

- It has been considered as serious injury due to a long recovery period and its causes are multifactorial.
- At the muscular level, there occurs overload of posterior tissue of calf and foot.
- Anatomic hyper pronation may be the cause for plantar fasciitis, so the limb should be kept opposite to pronation to relive pressure and pain. The main objective of treatment of plantar fasciitis is to relieve tenderness along the medial plantar surface and the reduction of excess pressure in that area and to reduce any tendency towards pronation.[90]

- Cavus foot type is associated with more plantar pressure as there is increased inclination of first metatarsal head and navicular.[91]
- Plantar fasciitis may cause heel pain syndrome - gradual onset pain described as burning sensation, with maximum tenderness just anterior to the plantar medial calcaneal tubercle.
- Plantar fascia pain is described as intensive pain in the morning with the first foot step from bed. Therefore, the pain follows a period of non-weight bearing and rest. The pain also recurs with prolonged weight bearing activity and continues until rest.[82]
- The occurrence of pain during early ambulatory period of non-weight bearing and rest is a pathognomic feature for heel pain syndrome.

DIAGNOSIS OF PLANTAR FASCIITIS

Currently, plantar fasciitis is mainly diagnosed based on the patient history and physical examination.[22] X-rays, blood tests and Electromyography (EMG) studies are done to rule out other disorders that cause heel pain. Pain is the common symptom over the inferior heel region for weight bearing individuals. The morning foot pain which lasts for about 30 to 40 minutes is because of the equinus position of foot during sleep in the night, which puts the plantar fascia under tension. The main characteristic feature of pain is sharp or knife-like intermittent pain, but the patients with chronic pain may describe the pain as dull or achy or constant, with the discomfort progressing distally to the entire band of plantar fascia.[19] Pain is usually insidious in nature. This condition is usually not completely disabling. However, patients frequently have limitations in their routine daily activities.

Using the physical activity sub-scales of the Health Status Questionnaire or foot

function index will give the status of the patient's functional activities limitation. Physical examination on deep palpation will reveal the extent of patient's discomfort and the exact location of the plantar fascia tenderness. Localized swelling would be observed in the chronic cases. Recent studies differentiate plantar fasciitis from other causes using ultrasonography and bone scintigraphy.[77]

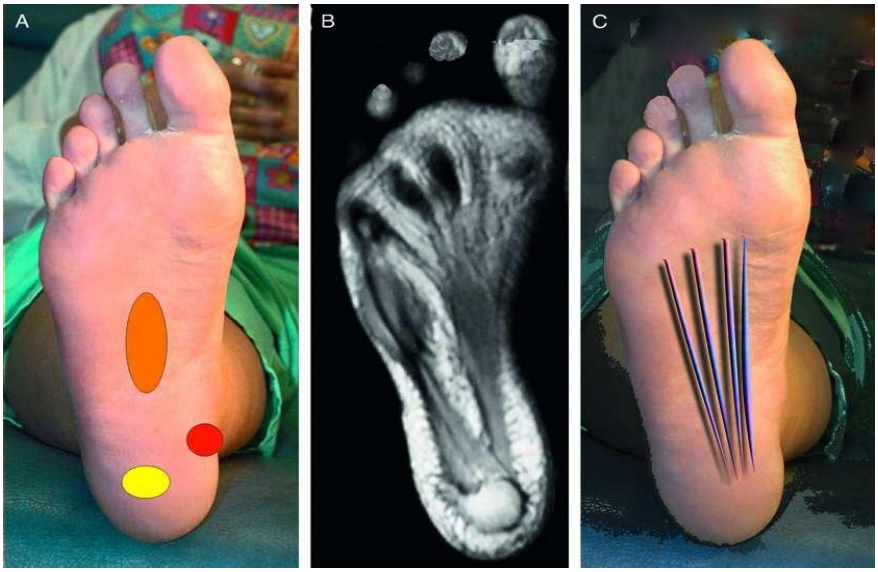


FIGURE 8: DIAGNOSIS OF HEEL PAIN[77]

A. Tenderness may be localised along plantar fascia (orange oval), along the plantar medial tuberosity (red circle) or directly plantar to the calcaneal tuberosity (yellow oval)

B. Anatomy of the plantar fascia as shown through Magnetic Resonance Imaging

C. Depicted here the lines of tension of the plantar fascia and its majority insertional attachment to the medial calcaneal tuberosity.

Plantar Fascia thickness measurement:

In clinical settings, Ultrasonography Thickness Values (USV) is a very valuable tool for assessing thickness and the echogenicity of plantar fascia. USV assessment is relatively fast, inexpensive and widely available. It may detect relatively small differences in plantar fascia even in clinically undetected cases. Increased thickness and hypo-echogenicity in the region of plantar fascia are consistent sonographic findings in those patients with PF. USV greater than 4 mm will be taken as abnormal. PF does not alter the thickness and echogenicity of heel pad; therefore, USV may help to find the difference between heel pad pathologies and PF. Ultrasound imaging could be as valuable as magnetic resonance image for detecting PF. In their study, all examinations were conducted by a podiatrist. Each subject was examined in prone position with 90° of knee flexion and ankle in neutral position. In a longitudinal view, the plantar fascia thickness was measured from anterior edge of inferior calcaneal border vertically to the inferior border of the plantar fascia. Finally, local or diffuse hypo-echogenicity at the insertion of the plantar fascia in the calcaneum were evaluated.[92]

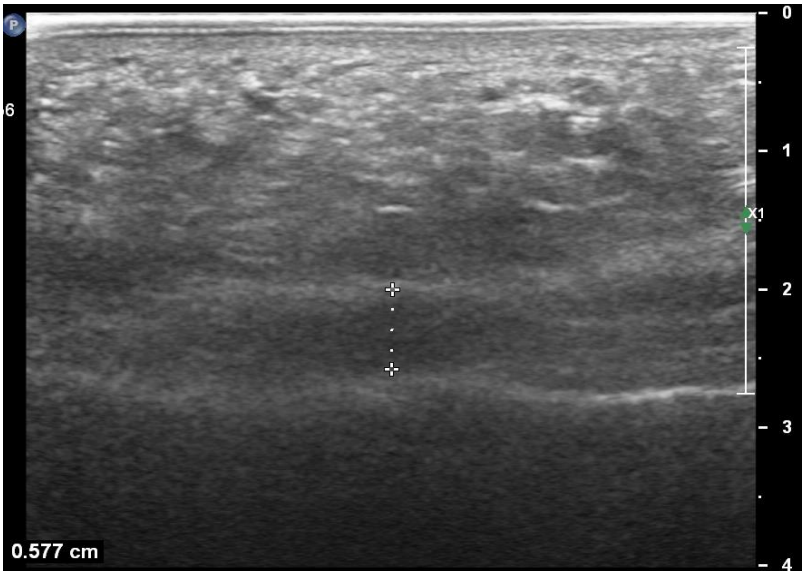


FIGURE 9: ULTRASONOGRAPHIC MEASUREMENT OF PLANTAR FASCIA THICKNESS.

TREATMENT MODALITIES FOR PLANTAR FASCIITIS

Conservative approach: Many studies stated that 90 to 95% of patients would be relieved of symptoms over the course of time, without the need of any surgical intervention.

1). To decrease pain and inflammation

Anti-inflammatory medications like NSAIDS and steroids may be used to minimize pain and swelling. Disadvantage of this mode of therapy is that it alters the structure of plantar fascia. Its advantage is that it provides immediate pain relief. There are many disadvantages with cortisone injections: osteomyelitis of calcaneum, loss of cushioning, fat pad atrophy, collagen degeneration and calcification, weakness and rupture of plantar fascia, which results in recurrent symptoms. Apart from medicines a variety of physical agents, including iontophoresis, phonophoresis, ultrasound, cryotherapy and hydrotherapy, have been described effectively in the management of plantar fasciitis, but their effectiveness is not well understood and results vary widely. A new mode of treatment was begun in the year 1992 in Europe - shock waves to treat any musculo-skeletal problems. Despite being a safer treatment the effectiveness is not well understood.[93]

2). To reduce tissue stress

Few treatment options like foot orthoses, foot taping, and change in foot wear reduce the amount of pressure to the inflamed tissue and correct the foot pronation which may be associated with plantar fasciitis.

Other treatment options include night splints; rest and walking casts, but there are doubts regarding their effectiveness. Orthotic devices are mainly custom orthotics, heel pad. The material used for arch supports may be rigid, semi rigid or soft. Most people prefer semi rigid

material due to its softness and its application which will reduce stress on the plantar fascia. In plantar fasciitis of chronic patients with marked limitation of activity, studies have made us understand that the best treatment is with below knee or walking cast for the time period of 3 to 6 weeks. This provides rest to the plantar fascia, minimizes pressure on the heel, provides support for the arch and prevents tightening of the Achilles tendon.[13]

3). To restore muscle strength and flexibility

Most patients have tightness of Achilles tendon with plantar fascia shortening due to pain. This increases the stress on the inflamed fascia during gait. The most effective treatment is stretching the foot to more midline or supinated foot in mid or terminal stance which will reduce strain on the fascia.[94]

PLATELET-RICH PLASMA

ANATOMY AND PHYSIOLOGY OF FUNCTION OF PLATELETS:

Platelets are described as small discoid blood cells (approximately 1-3 μm). The average platelet count varies from 1.5-3.0 x 10-5 per ml of blood and the half-life of platelets is about seven days. Platelets are formed from megakaryocytes and are synthesized in bone marrow by pinching off pieces of cytoplasm. Thereafter, platelets are extruded into the circulation. Platelets have a ring of contractile microtubules (cytoskeleton) around their periphery, containing actin and myosin. Inside the platelet, a number of intracellular structures are present containing lysosomes, glycogen and granules which may be of two types. These are the dense granules (which contain ADP, ATP, serotonin and calcium) and the α-granules (which contain clotting factors, growth factors and other proteins). Platelets are equipped with an extensively invaginated membrane with an intricate canalicular system, which may be in contact with the extracellular fluid. Normally, in the resting state, platelets

are non-thrombogenic and require a trigger before they become a potent and an active player in hemostasis and wound healing. Upon activation (e.g. by thrombin) they change shape and develop pseudopodia, which promotes platelet aggregation and the subsequent release of the granule content via the open canalicular system.[95]

Platelets play a role in haemostasis with plasma proteins and low molecular weight substances. Activation of platelets occurs on adhesion to damaged blood vessel wall, which in turn acts via the glycoprotein Ib and IIb/IIIa receptors which are found in the platelet membrane. On activation, the platelets change from discoid to spherical shape and aggregate to injured tissue.[96,97] Based on the fundamental role of platelets in hemostasis, as discussed above, it may be hypothesized that exogenously applied PRP would contribute to a more effective hemostatic condition of (surgical) wound surfaces, where it attaches to tissues as a solid platelet plug.[98]

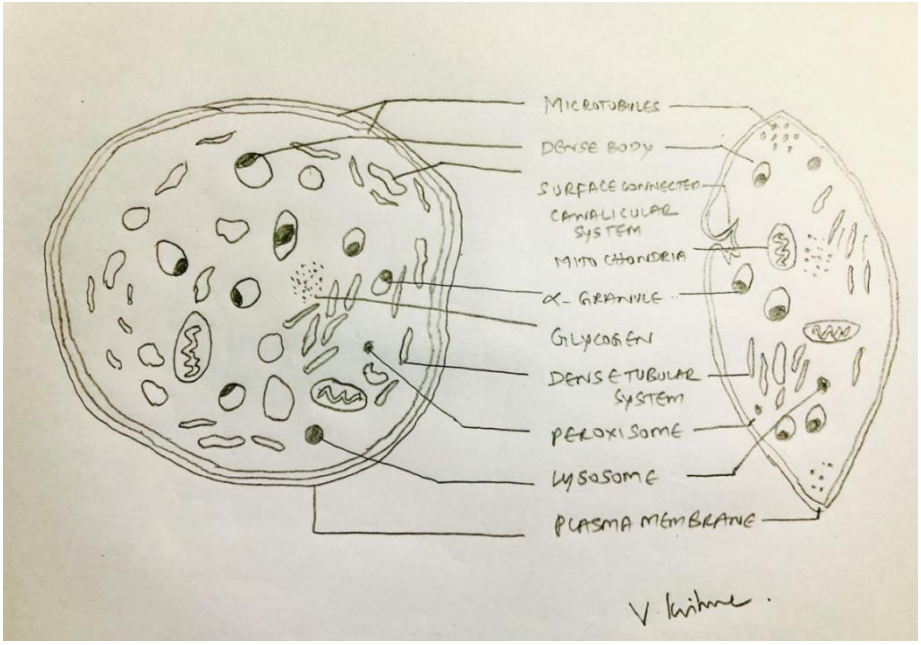


FIGURE 10: STRUCTURE OF PLATELETS[95] Platelets have no cell nucleus; they are fragments of cytoplasm that are derived from the megakaryocytes of the bone marrow, which then enter the circulation.

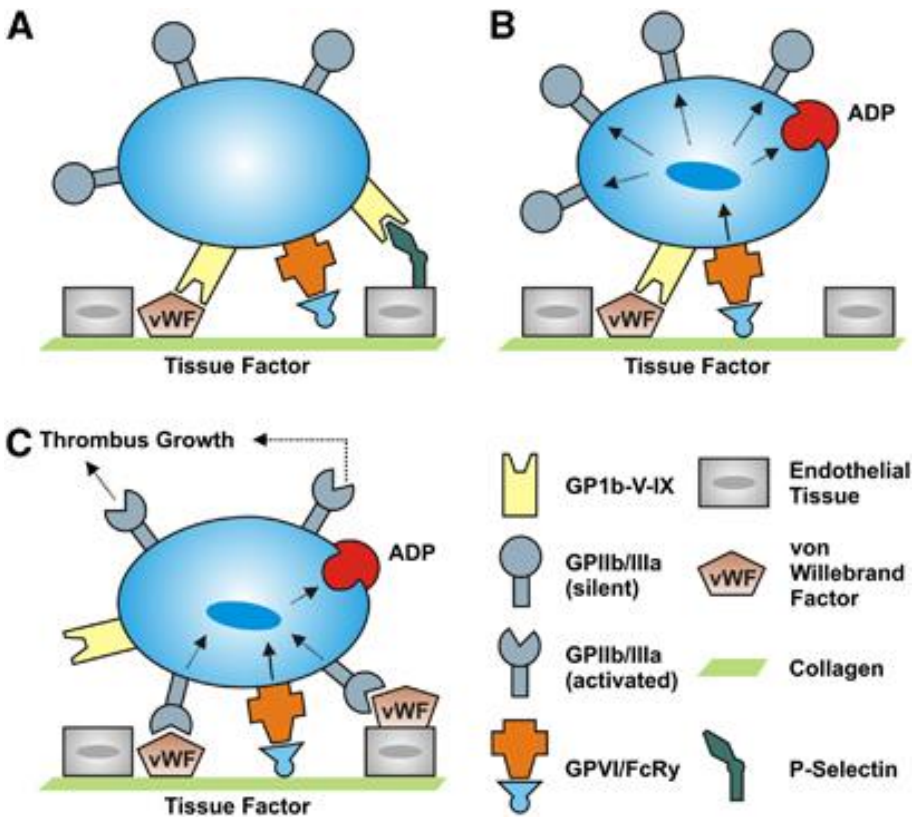


FIGURE 11 : STEPS OF PLATELET ADHESION, ACTIVATION AND AGGREGATION AT THE ACTIVATED ENDOTHELIUM.[95]

(A) The initial adhesion of platelets (tethering) is mediated by the binding of the glycoprotein (GP)Ib-V–IX receptor complex to the A1 domain of the von Willebrand factor (VWF) on endothelial cells. Additionally, binding to P-Selectin can enhance platelet recruitment to the intact vessel wall. (B) In a second step, interactions between GPVI and collagen stabilize the thrombus. Moreover, it comes to a cellular activation with secretion of platelet agonists (e.g., adenosine diphosphate, ADP) and transformation of the GPIIb/IIIa receptors to a state with high affinity. (C) The common final pathway of the platelet activation via the GPIIb/GPIIIa (integrin–fibrinogen) pathway culminates in an irreversible platelet aggregation and subsequent thrombus growth.

Secondary hemostasis is initiated by activating coagulation factors and the formation of a fibrin network that stabilizes the platelet plug.[98] The final step is the activation of leukocytes which invade the area following the release of cytokines. This also activates the fibrinolytic system leading ultimately to lysis of clot.

The process of wound healing is a well programmed and complex. The process of

events consists of inflammation over the first two days, angiogenesis on the 3rd day and fibroplasias from 3rd to 5th day, which is the initial step in collagen synthesis.[99] The binding of platelets to the injured tissue is by platelet tyrokinase receptor which is present on cell membrane of tissue cells.[100]

GROWTH FACTORS IN PLATLETS:

PDGF is a glycoprotein with a molecular weight of approximately 30 kD, with two disulphide-bonded polypeptides, referred to as A and B chains. There are three isoforms, PDGF AA, -BB and AA-. The most specific function of PDGF includes mitogenesis and angiogenesis and macrophage activation.[101] The production of PDGF and concluded that there are approximately 0.06 Nano grams of PDGF per 106 platelets, or about 1200 molecules per platelet.[102] Therefore, one might assume that platelet gel with a platelet count 3 to 5 excess folds the baseline level would have a profound effect on both wound healing and bone regeneration. Transforming growth factor beta are the proteins with a molecular weight of 25 kD. In humans, three subtypes of TGF- β are present, TGF-β1 and TGF-β2 appear to be the most important for general connective tissue repair and bone regeneration.[103] TGF-β is found predominantly in platelets which account for 95% of the total, while some is also found in macrophages. The other functions of TGF-β are to promote chemotaxis and mitogenesis of fibroblasts and osteoblastic precursor cells.[104,105] Very recently, a new PGF known as connective tissue growth factor was discovered.[105] The CTGF component is 20 times more of PDGF. Its main functions are angiogenetic activity, cartilage regeneration and fibrosis. According to literature, studies done in animals show that the platelets are elaborated from their source in the following way.[106]

Growth Factor Source

- Transforming Growth Factor-beta - platelets, extracellular matrix of bone, cartilage matrix, activated TH1cells and natural killer cells, macrophages / monocytes and neutrophils.
- Basic fibroblast growth factor-platelets, macrophages, mesenchyme cells, chondrocytes, osteoblasts.
- Platelet Derived Growth Factor- platelets, osteoblasts, endothelial cells, macrophages, monocytes and smooth muscles.
- Epidermal Growth Factor- platelets
- Vascular endothelial growth factor, VEGF- Connective tissue growth factor, CTGF Platelets through endocytosis from bone marrow's extracellular enviroment.[107]

Normal platelet activation leads to three necessary stages of healing: Inflammation, Proliferation and Remodeling.[108]

Inflammatory phase –

Platelets upon activation have the following functions:

- Anti-microbial
- Adhesion
- Aggregation
- Clot retraction
- Pro-coagulation
- Cytokine signaling

- Chemokine release
- Growth factor release

Following the initial inflammatory phase, which typically lasts for two to three days, fibroblasts enter the site and begin the proliferative phase. Low pH and low oxygen levels stimulate fibroblast proliferation in the injury site. Fibroblasts become the most abundant cell by day seven. The fibroblasts are then responsible for deposition of collagen and ground substance. This phase lasts for two to four weeks.

The Proliferative Phase –

Fibroblasts have the following functions:

• Wound contraction

• Peaks day 5-15

• Can last for weeks

• Fibroblasts differentiate into myofibroblasts

• Actin contracts making wound smaller

Low pH and hypoxemia stimulate neovascularization. Neovessels begin to form at approximately day 5 to 7 and this process proceeds until the neovessels disappear near completion of the remodeling phase.

The Remodeling Phase – Collagen maturation and strength.

Biotensegrity repair

• Starts when production and break down of collagen equalize

• Can last over a year

• Type III collagen is replaced by Type I collagen

• Reorganization occurs

• Blood vessels disappear

It has become apparent then, that PRP functions via a triad of interactions, known as the cell proliferation triangle. Each piece of this triangle must be present for effective tissue repair and pain relief.

The PRP's response on cellular mechanism of adult human mesenchyme stem cells (ahMSC). In soft tissue and bone healing, ahMSC are essential components for the repair process. It was shown that release of PRP growth factors stimulates the proliferation and migration of ahMSCs, in a PRP concentration dependent manner. A significant cellular response occurred with a 4 to 5 fold increase of platelet count, in comparison with the baseline platelet count.[107]

In another study, the fibroblast proliferation and type I collagen production were augmented by a four to five fold of increase in the PRP platelet count.[108]

PLATELET-RICH PLASMA DEFENSE AGAINST INFECTION:

However, little attention was given to the role of the WBC, in spite of the fact that platelet gel is a buffy coat product, including both neutrophils and monocytes containing high levels of myeloperoxidase (MPO), which might contribute to bacterial killing.[109] Theoretically, PRP might be an ideal autologous preparation of a biological blood product, rich in growth factors with enhanced antimicrobial capabilities. The neutrophils and macrophages are agents which kill the bacterial pathogens when suspended with PRP. The release of myeloperoxidase from neutrophils act as bacterial toxins.[110] The myeloperoxidase

catalyzes the oxidation of chloride to generate hypochlorous acid and other reactive oxygen radicals, these substances act as potent bacterial oxidants and kill microorganisms and fungi. There are recent studies which shows the release of antimicrobial properties present in PRP is also effective in staphylococcus aureus infections.[111]

In microbiological laboratories, it was found that PRP with an pH of 6.5 to 6.7, which is acidic when compared with mature blood clot of 7.0 to 7.2, does not promote infections.[112] The amount of growth factor yield depends on the preparation method and human variability.[113] Also, there is no benefit when poor content of PRP is used for the patient.

EVOLUTION OF PRP AS A MODALITY OF TREATMENT:

PRP is used to treat soft tissue injuries like tendinopathy, tendinosis, acute and chronic muscle strain, muscle fibrosis, ligamentous sprains and joint capsular laxity. PRP has also been utilized to treat intra-articular injuries used in multiple specialties such as maxillo-facial, cosmetic, spine, orthopaedic and for general healing of wound.

Authors evaluated the PRP for musculo-skeletal injuries in 20 patients. All the patients showed pain improvement, with 60% improvement noticed with one injection.[114] Also, the range of motion improved. The authors found positive outcomes in patients with plantar fasciitis with full pain relief and good functional motion. The efficacy of PRP injection in plantar fasciitis patients was also studied at a success rate of 77.8 per cent.[115]

In the year 2011 a study of PRP in plantar fasciitis with 30 patients. Good relief was observed in 28 patients after 6 months follow up.[116] Another study done in the year 2012 showed good results for injecting PRP in patients with chronic plantar fasciitis.[6]

PRP is always autologous and is not homologous. Homologous platelets are in viable

and cannot secrete bioactive growth factors. Homologous platelets are also antigenic due to the availability of cell membranes. Certainly, anti-platelet antibodies could develop from this product and second set reactions would follow. Such substances offer no useful comparison to PRP. PRP degranulates the granules in platelets, in which the synthesized and prepackaged growth factors are present. The secretion of these growth factors is started by the clotting process of blood and starts within ten minutes after clotting. More than 95% of the growth factors which are synthesized previously are produced within one hour. PRP is shown to remain sterile and the platelets which are concentrated are viable for up to eight hours once it is developed in the anti-coagulated condition and placed on a sterile surgical table. The use of PRP in musculo-skeletal problems was started from early 1990s. Its wide application includes in arthrofibrosis, articular cartilage, arthritis defects, meniscal injury and chronic synovitis or joint inflammation due to its mechanism of action and effectiveness of treatment.[117]

PRP is a blood component which contains platelet concentrations above the normal level and includes growth factors related to platelets and fibrinogen derived from plasma. Platelets are the front line healing response to injuries as they release growth factors for tissue repair.[118]

There are no significant demerits to the use of PRP as such. However, PRP applications can, under some conditions, result in morbidity at the injection site, infection, or nerve or blood vessel injury. The formation of scar tissue and calcification at the injection site was also documented. At the site of injection and even in the muscle or deeper places such as the bone, some patients also experienced acute aches or discomfort. In the injured region, patients with weakened immune systems or predisposed diseases are more vulnerable to infection. In the few people who have taken PRP enriched fractions, studies have documented allergic reactions. Since PRP is administered intravenously, there are chances of

harming the artery or veins that could lead to blood clotting. Studies have also suggested that people with a history of heavy smoking and drug and alcohol use and patients diagnosed with platelet dysfunction syndromes, thrombocytopenia, hyperfibrinogenemia, hemodynamic instability, sepsis, acute and chronic syndromes, should not use PRP based therapies.[85]

CORTICOSTEROID INJECTION (CSI)

CSIs are used for treatment of plantar fasciitis and are an effective modality for pain relief. Literature has shown evidence of complications associated with CSIs such as fascia rupture.[6]

Steroids are modifiers of the appearance of the plantar fascia ultrasonographically by reducing the thickness of the plantar fascia and decreasing the emergence of hypo echoic tissues. Corticosteroids also cause improvement in clinical symptoms associated with plantar fasciitis. Some authors, however, reached the conclusion that steroid injection might provide only short-term improvements, whereas others reported long-term positive effects of local steroid injection given in patients with plantar fasciitis. The PRP treatment resulted in effective reduction of pain in patients of normal weight compared to corticosteroid. Therefore, PRP was reported as a safe and highly effective treatment. It is observed that outcomes of plantar fasciitis treatment are multifactorial and disease duration, patient activities, comorbid diseases and obesity can influence the treatment outcomes.[31]

The process of pain relief is accelerated by corticosteroids because of its strong anti-inflammatory effect. The mechanism of action of corticosteroid is by inhibition of fibroblast proliferation and ground substance protein expression which are observed in cases of plantar fasciitis.

A meta-analysis found that CSI provided pain relief which is better than placebo in treating plantar fasciitis. It is cheap and easily prepared and performed and has a therapeutic effect which is acceptable. Currently, CSI is still one of the first-line treatments for plantar fasciitis. Nevertheless, if non-invasive treatments could provide a beneficiary effect equal to that of CSI, the plantar fasciitis patients would choose non-invasive treatments over CSI as their first choice. CSIs involve local, concentrated administration and are generally reserved as a tertiary level of treatment after failure of other primary conservative measures (e.g., stretching, shoe inserts, or orthoses) in severe recalcitrant cases. Whether or not injected corticosteroids alter the long-term pathology of chronic inflammation, many patients experience acute symptomatic improvement.[6]

SURGICAL OPTIONS

Many surgeons do not prefer surgery as it is best cured by conservative treatment. Surgical options are only for patients within irreducible heel pain which is restricting their functional activities. Surgical treatment is the last option for treating plantar fasciitis, with failure of conservative management. Many authors do not suggest a time frame beyond which to proceed with surgical intervention, while a few suggest duration of one year and more. And others, more than two years duration.[118] There have been more than 30 surgical series that have been reported on the treatment of plantar fasciitis in the literature. The operations have included calcaneus drilling decompression, steindler stripping, plantar fasciotomy, heel spur excision, abductor digiti minimi nerve neurolysis, calcaneal nerve neurolysis and calcaneal neurectomy. Almost all of these interventions have been associated with a high success rate.

Studies have shown that there is good success rate in the span of eight months with

rehabilitation. Post-surgical complication it decreases the stiffness of the foot, resulting in a less rigid and deformed arch.[60]

Surgical procedures, such as plantar fascia release by fasciotomy, are usually mentioned as last resort options for plantar fasciitis treatment in patients with persistent, recalcitrant heel pain after receiving other modes of treatments.

MATERIALS AND METHODS

MATERIALS AND METHODS

The present study was conducted between August 2018 to September 2020 at Department of Orthopaedics, R. L. Jalappa Hospital and Research Centre, Tamaka, Kolar. 110 cases that were diagnosed with chronic plantar fasciitis were treated with corticosteroid (methyl prednisolone) and PRP injection. Patients were considered for follow up for a period of 6 months using VAS, FAI and Roles Maudsley Score, AOFAS and Ultrasonogram plantar fascia thickness.

INCLUSION CRITERIA:

1. Patients diagnosed with plantar fasciitis for duration of more than 3 months.
2. Failure of conservative treatment in the form of stretching exercises, non-steroidal anti-inflammatory drugs and heel cushion pads for 3 months.
3. Visual analog scale pain higher than 6 (on a 10-point VAS).
4. Plantar fascia thickness assessment using ultrasonogram >5mm.

EXCLUSION CRITERIA:

1. Any history of previous surgeries in ankle and foot.
2. Associated pathology involving the lower limb such as history of tarsal tunnel syndrome/ effusion of the ankle/ Achilles tendinopathy/ any deformity of foot and ankle like subtle cavus foot deformities, physiological flat foot deformities, seronegative arthritis.
3. Pregnancy
4. Any recent history of aspirin or aspirin like drug intake

Diagnosis of plantar fasciitis was made clinically according to guidelines which includes medial plantar or heel region tenderness on palpation. Pain is felt mostly with initial steps after an inactive period but may worsen following weight bearing for prolonged duration and pain often gets increased by a recent increase in weight bearing.[26]

The following investigations were done: plain radiograph - antero-posterior/ oblique/lateral views, hemoglobin, bleeding time, clotting time, random blood sugar, serum urea, serum creatinine.

PLATELET-RICH PLASMA PREPARATION TECHNIQUE

Patients were divided into two groups randomly. Base line VAS /Foot Ankle score Instrument/American orthopaedic and Ankle Society/ Roles Maudsley Score and ultrasonogram of plantar fascia was evaluated. Odd number patients were assigned to group A and these 55 patients received PRP injection. Even number patients were in group B and these 55 patients received corticosteroid (methyl prednisolone) injection.

Under aseptic precautions, 27 ml of the patient's peripheral whole blood was obtained using an 18-gauge needle. Then, 3ml sodium citrate was added to the collected blood (in ratio of 1:9) and around 3 ml PRP was extracted by a double centrifugation technique at 1300 rpm for 10 minutes to separate erythrocytes and then again for 10 minutes at 3500 rpm to concentrate platelets by centrifugation. PRP injections were given to group A. Corticosteroid - 2ml (40 mg) methyl prednisolone with 2 ml of sterile water for injections was injected in group B patients.

All injections (for PRP and corticosteroids) were given by the Orthopaedician, with the patient in supine position and the ankle in neutral position. Majority of the patients received injection in medial plantar heel region and some patients received injection at the maximum point of the tenderness.

FIGURE 12: LABORATORY CENTRIFUGE MACHINE

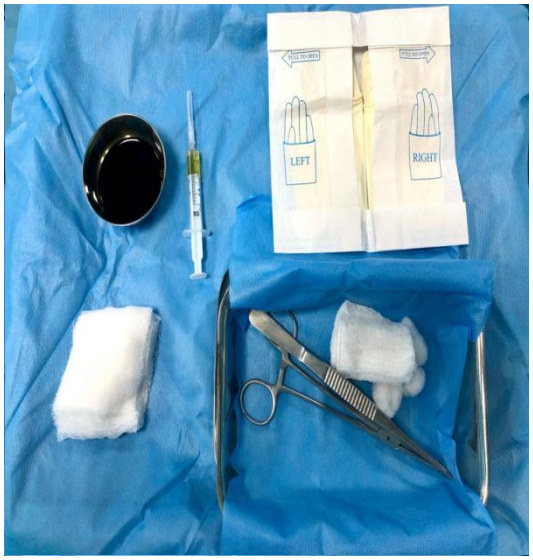
This is an image of laboratory centrifuge machine (REMI R-8C*PLUS)*

A. 

B. 

FIGURE 13: A) METHYL PREDNISOLONE ACETATE INJECTION

B) PLATELET-RICH PLASMA



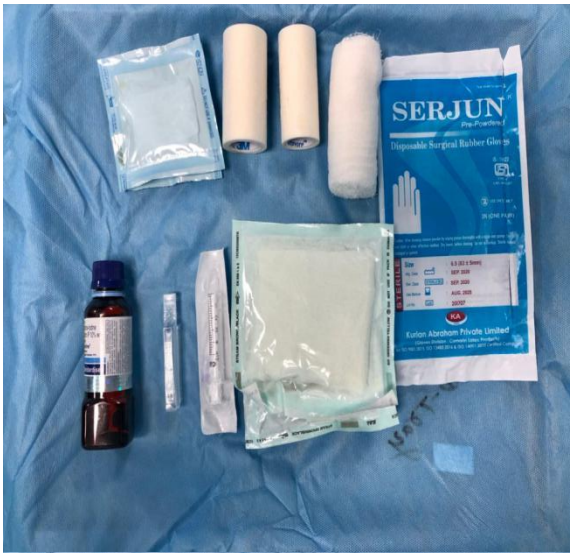
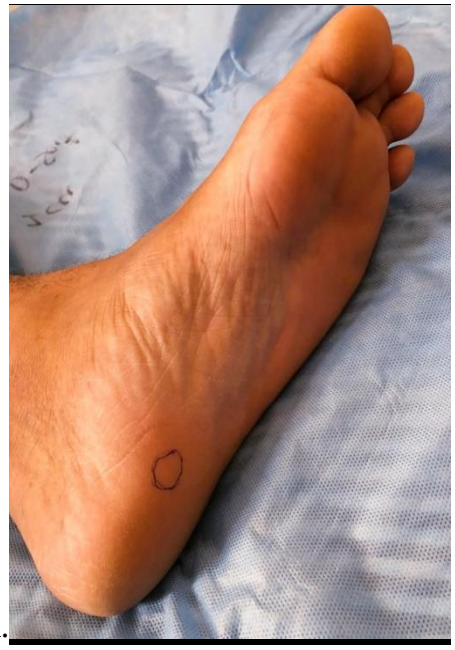


FIGURE 14: BASIC ARMAMENTARIUM FOR INJECTION PROCEDURE

A.  B. 

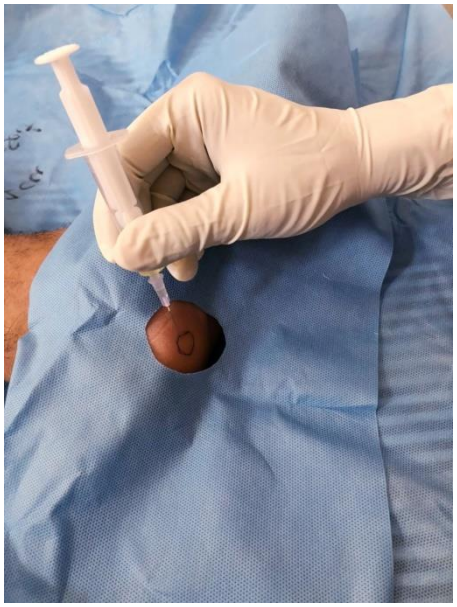
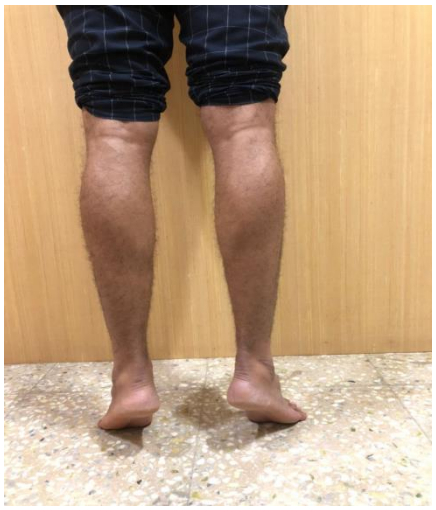
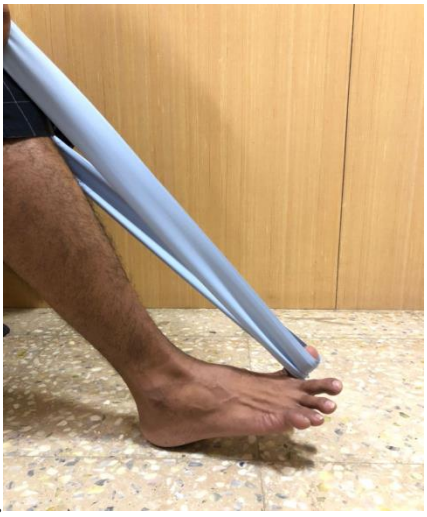
C.  D. 

FIGURE 15: PRP INJECTION PROCEDURE A) Site of the injection at maximum point of tenderness. B) Injection part was painted and draped. C) Needle placed perpendicular to site of the injection. D) PRP administered to cover the maximum area of tenderness.

Post injection protocol:

Immediately after receiving the injection, the patients were to remain in sitting position without moving the foot for 15 minutes. Patients were taught regarding strengthening and stretching exercises. Patients were sent home with instructions to limit usage of their feet for approximately 48 hours. The usage of non-steroidal medication was prohibited. After 48 hours, patients are given a standardized stretching protocol to follow. Strengthening exercises were to be performed slowly, 3–4 s concentric followed by 3–4 s eccentric contractions and consisted of: (1) Heel-rises. (2) Flexing the first toe against elastic band. (3) Inversion of foot against elastic band. (4) Standing with toe balls against a wall stretching the calf 3 × 30 s. (5) Stretching of the PF by kneeling while sitting on the heel with dorsiflexed ankle and toes 3 × 30 s. (6) Manual stretching of the PF 10 × 10 s for 2 weeks.[7,12] A formal strengthening program is initiated after this stretching. After 4 weeks of procedure, patients are allowed to proceed with normal sporting or recreational activities as much as they tolerate.

A. 

B. 

C. 

D. 

E. 

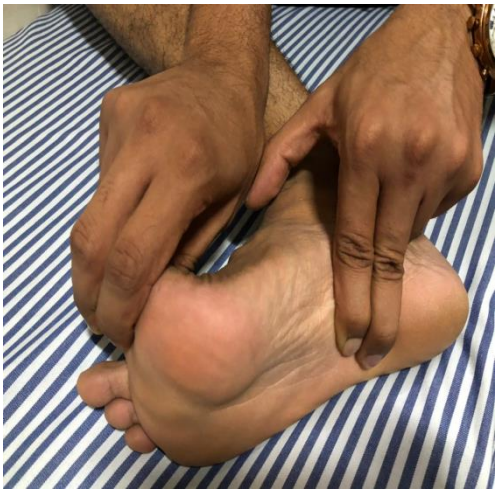
F. 

FIGURE 16: Plantar fascia - Strengthening & Stretching exercise : A). Heel-rises. B). Flexing the first toe against elastic band. C). Inversion of foot against elastic band. D). Standing with toe balls against a wall stretching the calf. E). Stretching of the PF kneeling while sitting on the heel with dorsiflexed ankle and toes. F). Manual stretching of the PF.

Follow up

Follow up was done for all the patients. With each follow up, assessment of clinical, subjective, radiological and functional outcomes was done at 1 month, 3 months, and 6

months by using VAS/FAI and Roles Maudsley Score, AOFAS and Ultrasonogram plantar fascia.

ASSESSMENT OF RESULTS

Evaluation was done for the treatment results of chronic plantar fasciitis using corticosteroid and PRP injections.

STATISTICAL ANALYSIS:

All the data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 software. Continuous variables are taken as mean +/- SD if the date were unevenly distributed. Difference in mean between the groups compared by using independent student 't' test. Graphical representation of data: Microsoft excel and Microsoft word was used to obtain various types of graphs such as bar diagram and pie diagram.

RESULTS & OBSERVATION

RESULTS AND OBSERVATIONS

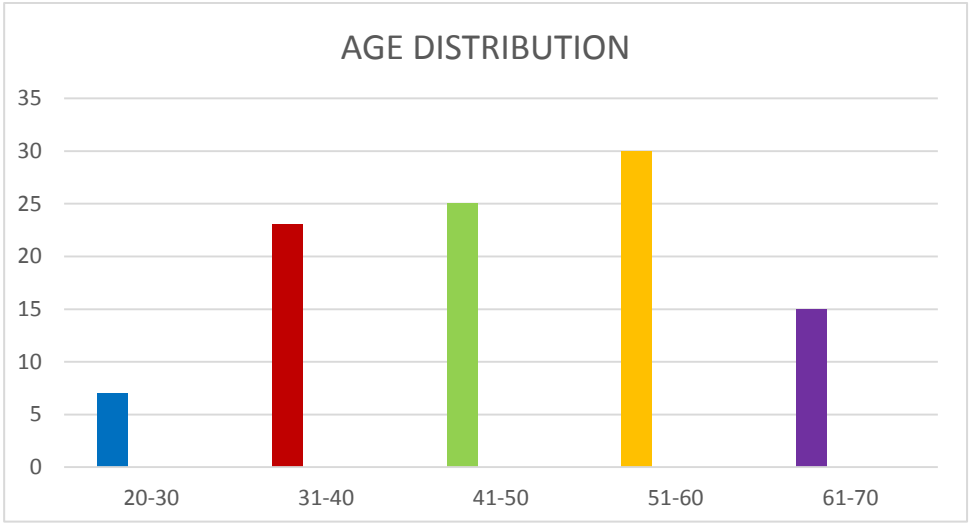
DEMOGRAPHIC DETAILS OF THE STUDY PATIENTS

TABLE 1: AGE DISTRIBUTION

AGE	NUMBER OF PATIENTS	PERCENTAGE
18-30	7	7
31-40	23	23
41-50	25	25
51-60	30	30
61-70	15	15
TOTAL	100	100

In our study, age distribution of 18-30, 31-40, 41-50, 51-60, 61-70 in 7, 23, 25, 30 and 15 patients respectively. Most of patients were in the age group ranging from 18-70 years, the mean age groups in PRP and CSIs groups were 46.74 ± 12.45 years and 48.5 ± 10.39 years respectively.

The youngest patient was aged 26 years and the oldest was 67 years old.

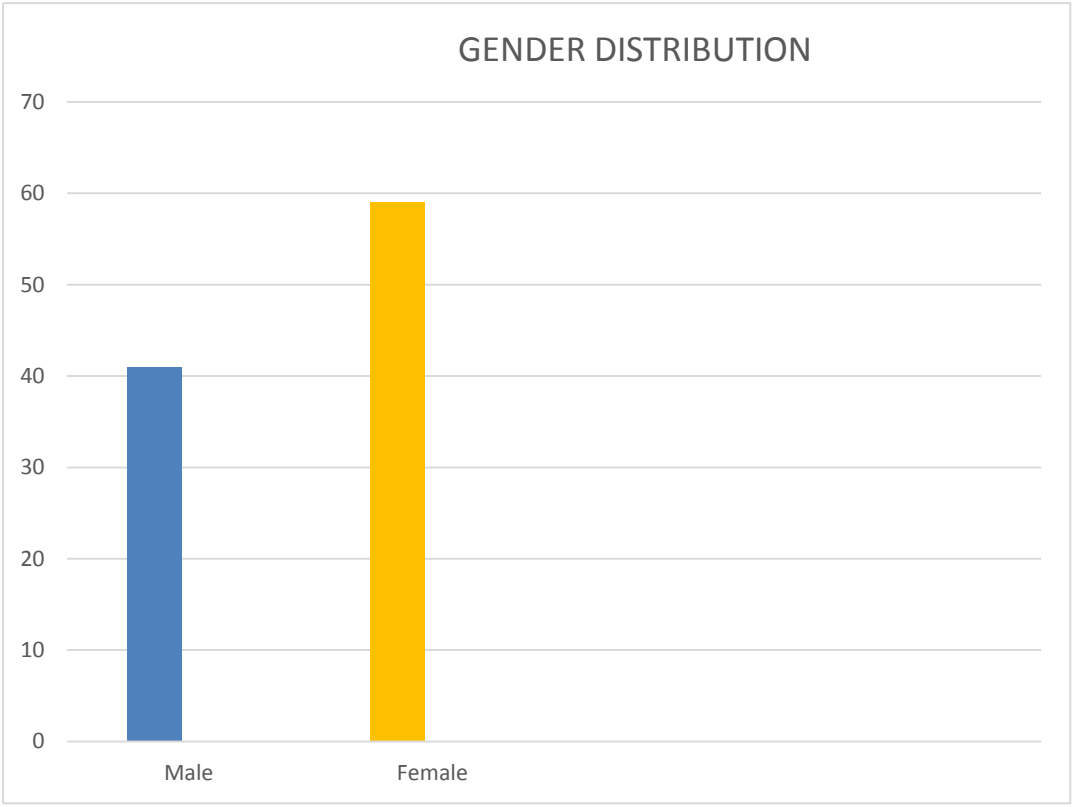


GRAPH 1: BAR DIAGRAM SHOWING AGE DISTRIBUTION OF STUDY POPULATION

TABLE 2: GENDER DISTRIBUTION

GENDER	NUMBER OF PATIENTS	PERCENTAGE
MALE	41	41
FEMALE	59	59
TOTAL	100	100

Out of 100 patients, 41 were male and 59 were female.

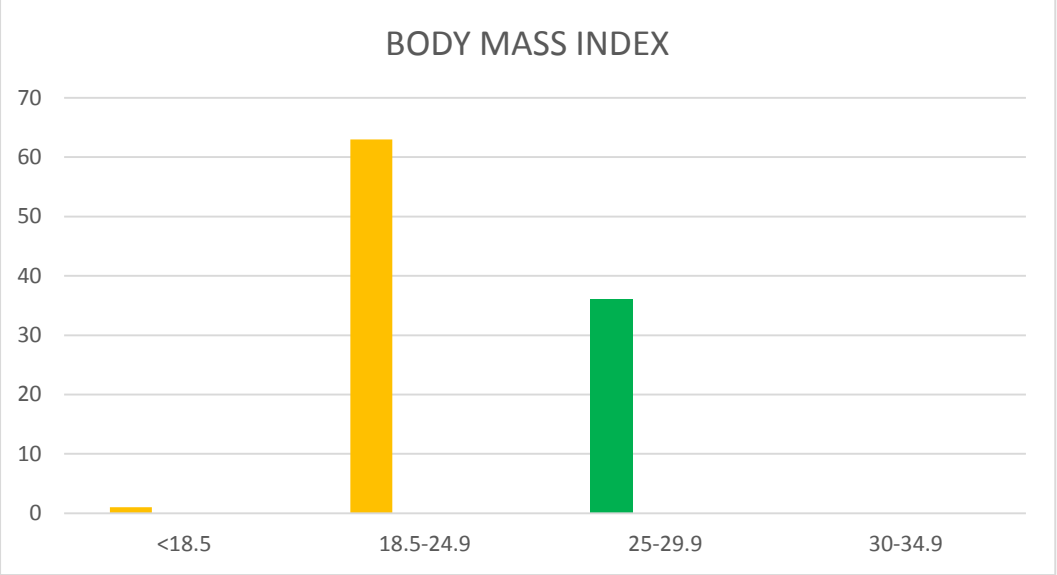


GRAPH 2: BAR DIAGRAM SHOWING GENDER DISTRIBUTION OF STUDY POPULATION

TABLE 3: BODY MASS INDEX

BMI	NUMBER OF PATIENTS	PERCENTAGE
<18.5	1	1
18.5-24.9	63	63
25-29.9	36	36
30- 34.9	0	0
TOTAL	100	100

In our study, BMI less than 18.5, 18.5 - 24.9, 25-29.9, 30-34.9 in 1, 63, 36 and 0 patients respectively, most of patients were in the normal weight range of 18.5 to 24.9, mean BMI being 23.6.

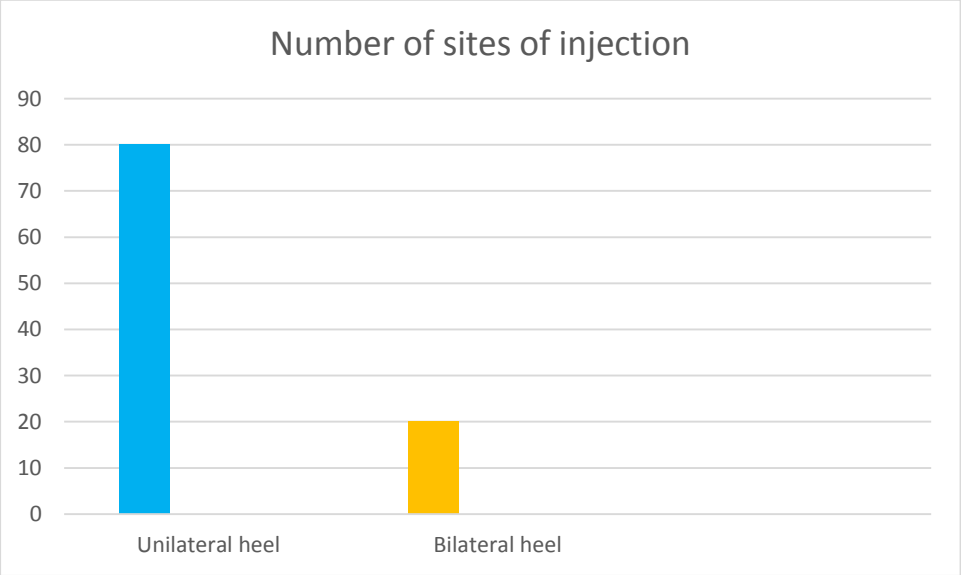


GRAPH 3: BAR DIAGRAM SHOWING BMI DISTRIBUTION OF STUDY POPULATION

TABLE 4: NUMBER OF SITES OF INJECTION

NUMBER OF SITES	FREQUENCY	PERCENTAGE
BILATERAL (BOTH HEELS)	20	20
UNILATERAL (ONE HEEL)	80	80
TOTAL	100	100

In the study, of 120 heels, it was observed that 20 patients (i.e. 20 %) received injections in both the heels and 80 patients (i.e. 80%) received injections in one heel (unilaterally).



GRAPH 4: BAR DIAGRAM SHOWING DISTRIBUTION OF PATIENTS ACCORDING TO NUMBER OF SITES OF INJECTION

TABLE 5: AGE AND BMI IN BOTH GROUPS:

GROUP		MEAN	STD. DEVIATION	p VALUE
AGE	PLATELET-RICH PLASMA	46.74	12.454	0.445
	CORTICOSTEROID	48.50	10.391	
BMI	PLATELET-RICH PLASMA	24.186	2.5043	0.130
	CORTICOSTEROID	23.376	2.7903	

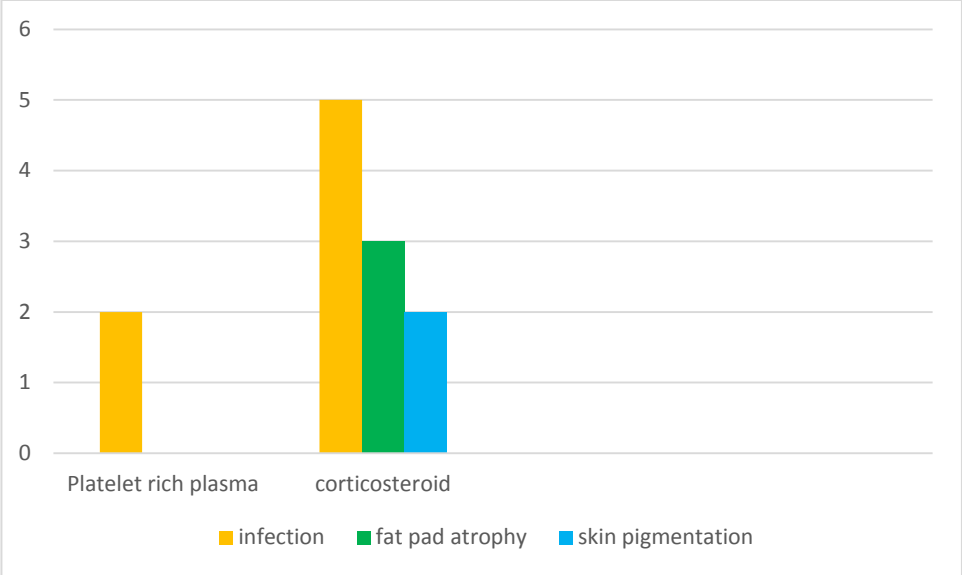
In the study the mean age in PRP injections group was 46.74 ± 12.45 years and whereas in corticosteroid group, mean age was 48.5± 10.39 years. Mean BMI of the subjects in PRP injections group was 24.1± 2.50 and in corticosteroid group was 23.37 ± 2.79. p value of age (0.445) and BMI (0.130) was not statistically significant.

TABLE 6: POST-OPERATIVE COMPLICATIONS

POST-OPERATIVE COMPLICATIONS	PLATELET-RICH PLASMA	CORTICOSTEROID	PERCENTAGE
INFECTIONS	2	5	7
FAT PAD ATROPHY	0	2	2
SKIN DEPIGMENTATION	0	3	3
NO COMPLICATIONS	48	40	88
TOTAL	50	50	100

In this study, out of 100 patients, two patients had post-operative complications (Infection) with PRP injection while ten patients had post-operative complications (five patients developed infections, three patients developed skin depigmentation, and two patients had atrophy of fat pad) with CSI. All five patients were tracked before final follow up. The size of skin depigmentation and fat pad atrophy remain the same. No worsening of the condition was found in any of these patients.

Two patients with infection (superficial) in PRP group healed rapidly without any antibiotic administration. The five patients with infection (superficial) in corticosteroid group were treated with oral antibiotics following culture and sensitivity, which took longer time to heal compared to patients in PRP group.

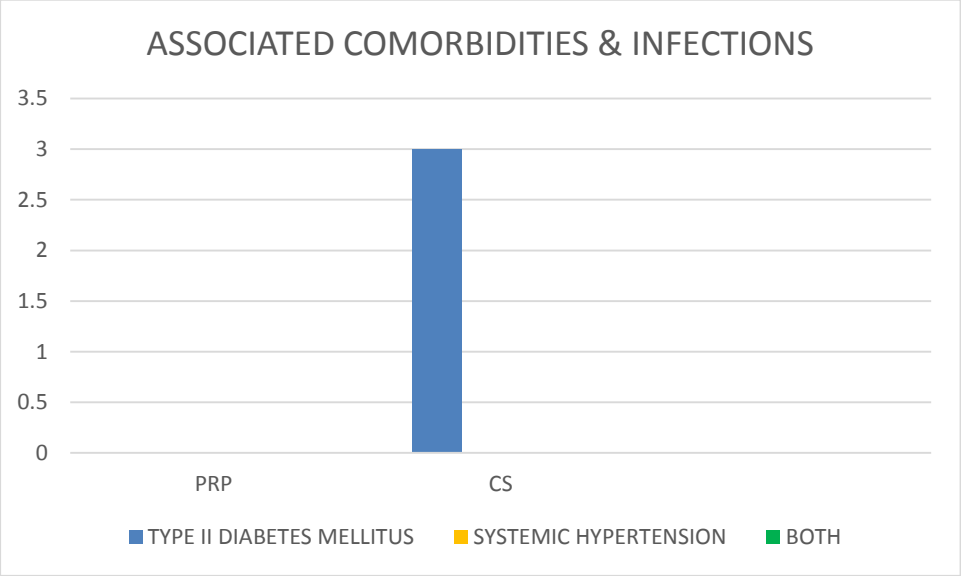


GRAPH 5: BAR DIAGRAM SHOWING POST-OPERATIVE COMPLICATIONS

TABLE 7: ASSOCIATED COMORBIDITIES AND INFECTIONS

COMORBIDITIES	NUMBER OF PATIENTS	INFECTION GROUPS	
		PRP	CS
TYPE II DIABETES MELLITUS	15	0	3
SYSTEMIC HYPERTENSION	11	0	0
BOTH DIABETES AND HYPERTENSION	3	0	0
TOTAL	29/100	0/50	3/50

In our study population, 15 patients had type II diabetes mellitus and 11 had systemic hypertension. Three patients had both diabetes and hypertension. In corticosteroid injection (methyl prednisolone) group, five patients developed infection as complication, of which three patients had type II diabetes mellitus.

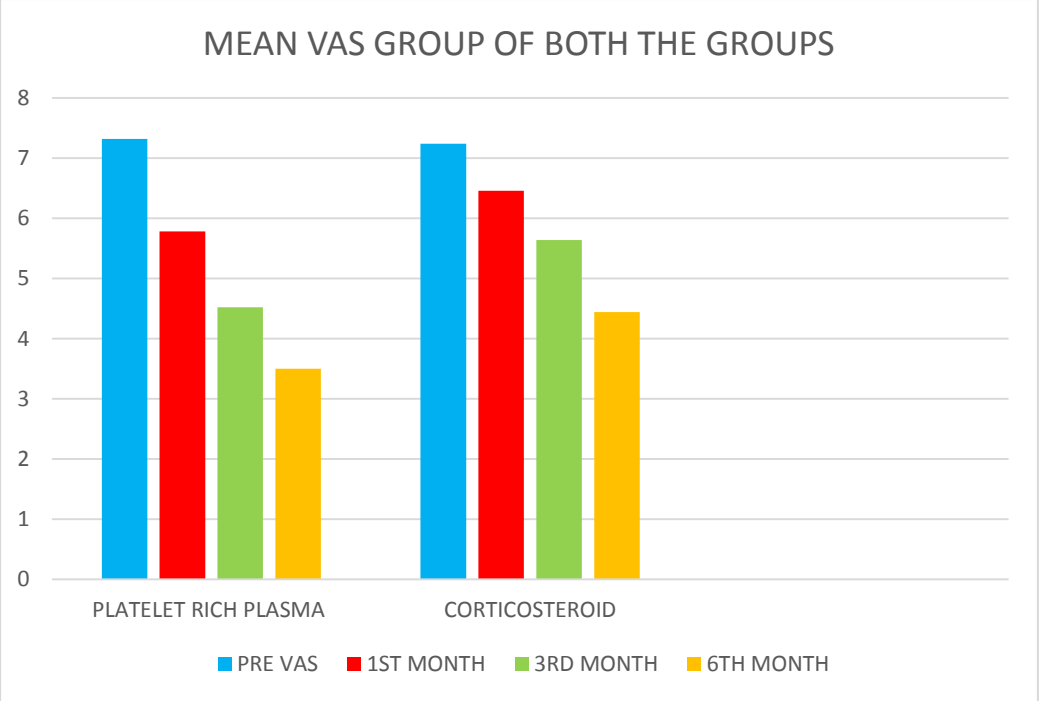


GRAPH 6: BAR DIAGRAM SHOWING ASSOCIATED COMORBIDITIES AND INFECTIONS

TABLE 8: VISUAL ANALOG SCALE IN BOTH GROUPS:

GROUP		MEAN	STD. DEVIATION	p VALUE
PREVAS	**PRP**	7.32	0.587	0.048
	CS	7.24	0.555	
VAS 1MON	**PRP**	5.78	0.679	0.001
	CS	6.46	0.813	
VAS 3 MON	**PRP**	4.52	0.505	0.001
	CS	5.64	0.693	
VAS 6 MON	**PRP**	3.50	0.614	0.001
	CS	4.44	0.501	

In this study, the mean VAS for the patients in PRP injections group (pre- injection, 1st month, 3rd month & 6th month) were 7.32, 5.78, 4.52, 3.50 respectively and mean VAS of the subjects in CSIs group (pre-injection, 1st month, 3rd month & 6th month) were 7.24, 6.46, 5.64 and 4.44 respectively. p value is statistically significant between the groups (VAS at 1st month, 3rd month & 6th month) as p value <0.001.

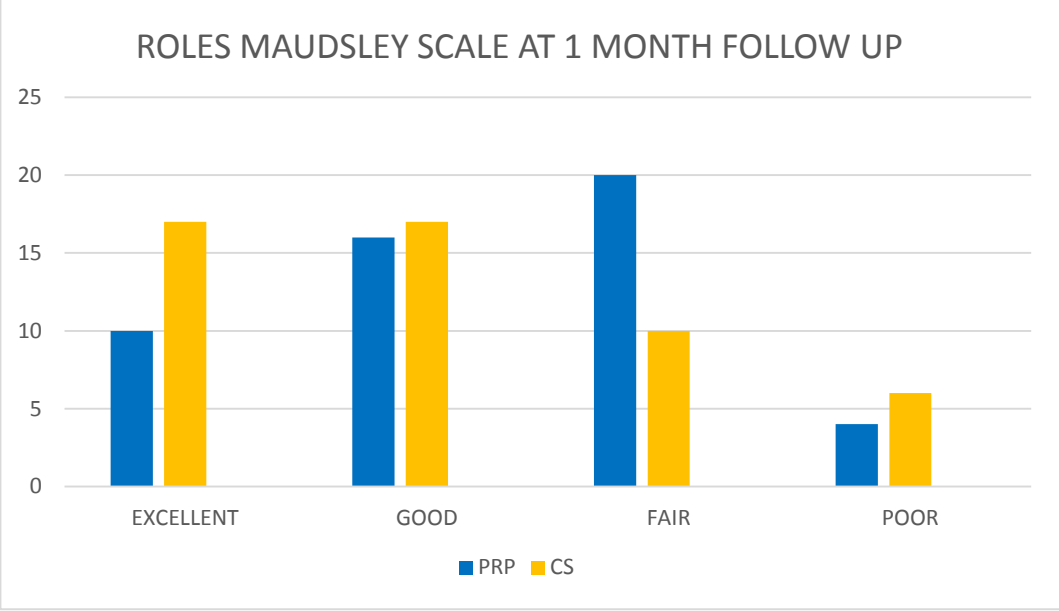


GRAPH 7: BAR DIAGRAM SHOWING MEAN VISUAL ANALOG SCALE OF BOTH THE GROUPS

TABLE 9: ROLES MAUDSLEY SCORE AT 1 MONTH FOLLOW UP IN BOTH GROUPS :

		GROUP		TOTAL
		PRP	CS	
ROLES 1 MON	E	10	17	27
	G	16	17	33
	F	20	10	30
	P	4	6	10
TOTAL		50	50	100

In Roles Maudsley Score after 1 month follow up in PRP injections group were excellent, good, fair and poor in 10, 16, 20, 4 patients respectively and in corticosteroid group was excellent, good, fair and poor in 17, 17, 10 and 6 patients respectively.

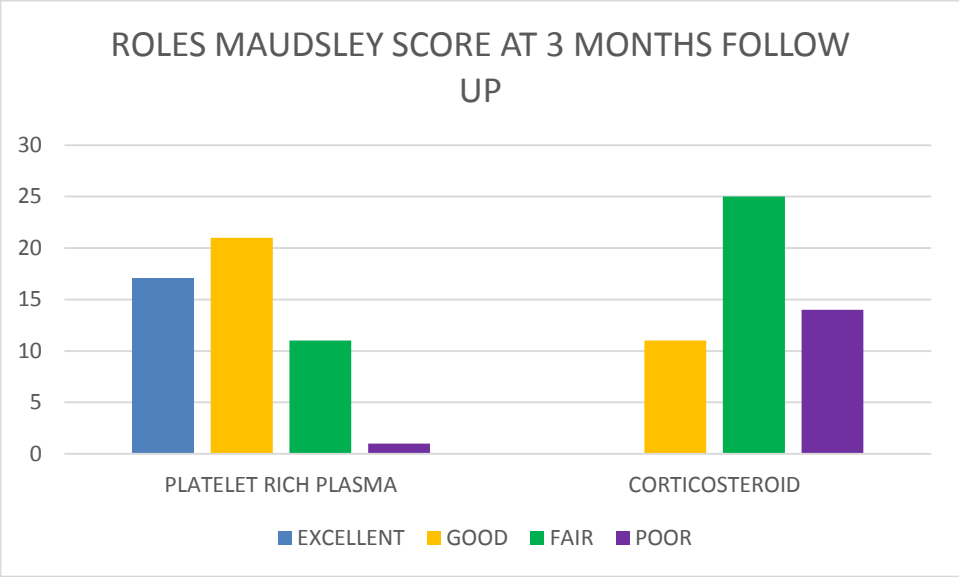


GRAPH 8: BAR DIAGRAM SHOWING ROLES MAUDSLEY SCORE AT 1 MONTH FOLLOW UP OF BOTH THE GROUPS

TABLE 10: ROLES MAUDSLEY SCORE AT 3 MONTHS FOLLOW UP IN BOTH GROUPS:

		GROUP		TOTAL
		PRP	CS	
ROLES 3 MON	E	17	0	17
	G	21	11	32
	F	11	25	36
	P	1	14	15
TOTAL		50	50	100

The Roles Maudsley Score at 3rd month follow up in PRP injections group were excellent, good, fair and poor in 17, 21, 11, 1 patients respectively and in corticosteroid group was excellent, good, fair and poor in 0, 11, 25 and 14 patients respectively.

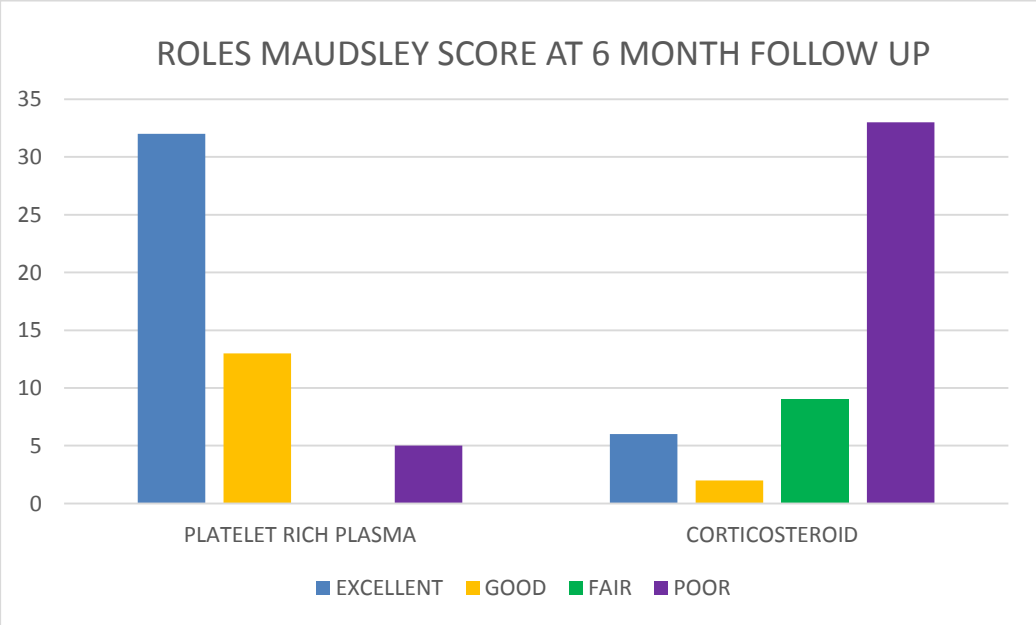


GRAPH 9: BAR DIAGRAM SHOWING ROLES MAUDSLEY SCORE AT 3 MONTHS FOLLOW UP OF BOTH THE GROUPS

TABLE 11: ROLES MAUDSLEY SCORE AT 6 MONTH FOLLOW UP IN BOTH GROUPS:

		GROUP		TOTAL
		PRP	CS	
ROLES 6 MON	E	32	6	38
	G	13	2	15
	F	0	9	9
	P	5	33	38
TOTAL		50	50	100

The Roles Maudsley Score at 6 month follow up in PRP group were excellent, good, fair and poor in 32, 13, 0, 5 patients respectively and in corticosteroid group was excellent, good, fair and poor in 6, 2, 9 and 33 patients respectively.

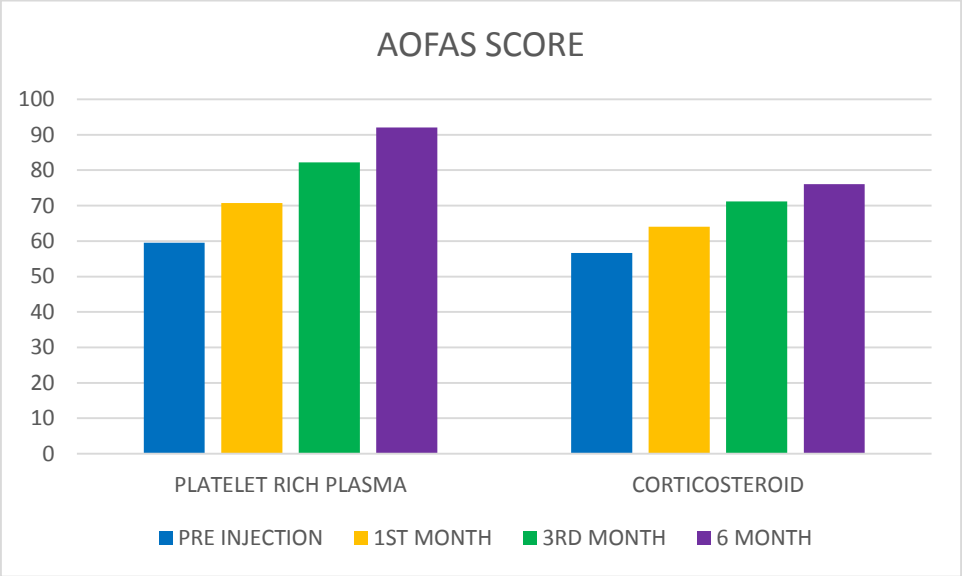


GRAPH 10: BAR DIAGRAM SHOWING ROLES MAUDSLEY SCORE AT 6 MONTHS FOLLOW UP OF BOTH THE GROUPS

TABLE 12: AOFAS SCORE IN BOTH GROUPS:

GROUP		MEAN	STD. DEVIATION	p VALUE
PRE -INJECTION AOFAS	**PRP**	59.58	6.716	0.038
	CS	56.62	7.318	
1 MON AOFAS	**PRP**	70.74	5.986	0.001
	CS	64.08	6.064	
3 MON AOFAS	**PRP**	82.20	5.555	0.001
	CS	71.22	5.407	
6 MON AOFAS	**PRP**	92.04	3.860	0.001
	CS	76.08	5.054	

In the study, the mean score of AOFAS of the subjects in PRP injections (pre- injection, 1st month, 3rd month & 6th month) were 59.58, 70.74, 82.20, 92.04 respectively and mean AOFAS of the subjects in CSIs (pre-injection, 1st month, 3rd month & 6th month) was 56.62, 64.08, 71.22, 76.08 respectively. p value is statistically significant between the groups (AOFAS at 1st month, 3rd month & 6th month) as p value <0.001.

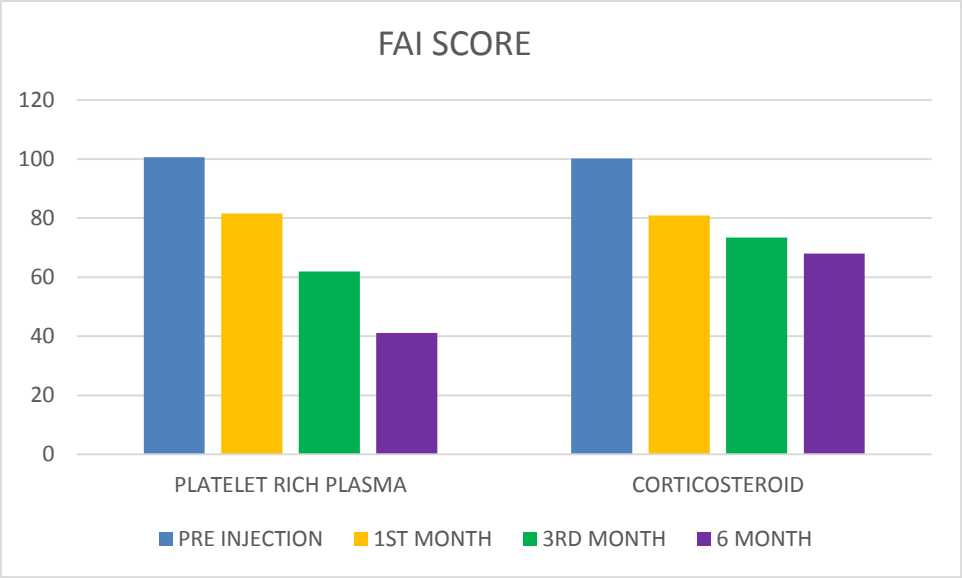


GRAPH 11: BAR DIAGRAM SHOWING MEAN AOFAS SCORE OF BOTH THE GROUPS

TABLE 13: FAI SCORE IN BOTH GROUPS:

GROUP		MEAN	STD. DEVIATION	p VALUE
PRE-INJECTION FAI	**PRP**	100.58	5.183	0.646
	CS	100.14	4.324	
1 MONTH FAI	**PRP**	81.54	6.264	0.519
	CS	80.84	4.372	
3 MONTH FAI	**PRP**	61.86	5.775	0.001
	CS	73.40	4.051	
6 MONTH FAI	**PRP**	41.10	5.346	0.001
	CS	68.00	4.000	

In the study, the mean FAI score of the subjects in PRP injections group (pre-injection, 1st month, 3rd month & 6th month) was 100.58, 81.54, 61.86, 41.10 respectively. Mean FAI score of the subjects in CSs group (pre-injection, 1st month, 3rd month & 6th month) was 100.14, 80.84, 73.40, 68.00 respectively. p value was statistically significant between groups in 3rd month & 6th month as p value less than 0.001.

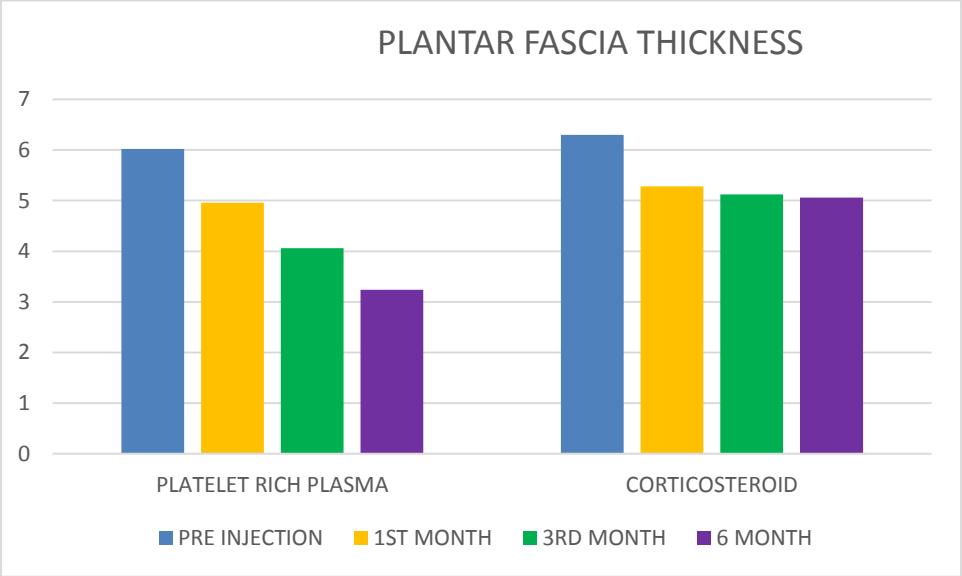


GRAPH 12: BAR DIAGRAM SHOWING MEAN FAI SCORE OF BOTH THE GROUPS

TABLE 14: PLANTAR FASCIA THICKNESS IN BOTH GROUPS:

GROUP		MEAN	STD. DEVIATION	p VALUE
PRE-INJECTION PF	**PRP**	6.02	0.769	0.061
	CS	6.30	0.707	
1 MONTH PF	**PRP**	4.96	0.402	0.001
	CS	5.28	0.454	
3 MONTH PF	**PRP**	4.06	0.240	0.001
	CS	5.12	0.480	
6 MONTH PF	**PRP**	3.24	0.431	0.001
	CS	5.06	0.512	

In the study the mean thickness of plantar fascia of the subjects in PRP injections group (pre-injection, 1st month, 3rd month & 6th month) were 6.02, 4.96, 4.06, 3.24 respectively and mean thickness of plantar fascia of the subjects in CSIs group (pre-injection, 1st month, 3rd month & 6th month) was 6.30, 5.28, 5.12, 5.06 respectively. p value is statistically significant between the groups in measuring plantar fascia thickness at 1st month, 3rd month & 6th month as p value is less than 0.001.



GRAPH 13: BAR DIAGRAM SHOWING MEAN PLANTAR FASCIA THICKNESS OF BOTH THE GROUPS

TABLE 15: FINAL OUTCOMES OF MEAN DIFFERENCE BETWEEN PRP AND CS FOR CONTINUOUS VARIABLES

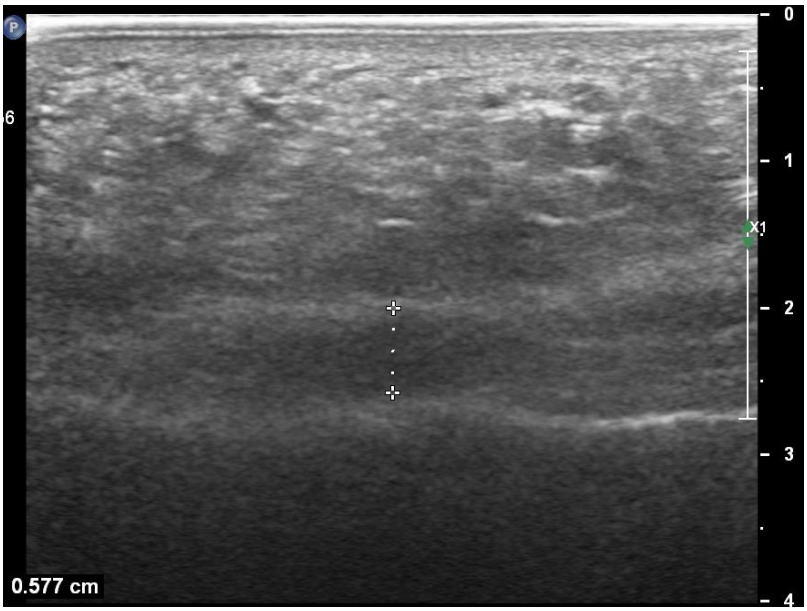
	PRP		CS		p VALUE
	MEAN	SD	MEAN	SD	
VAS SCORE AT 6 MONTHS FOLLOW UP	3.50	0.614	4.44	0.501	0.001
AOFAS SCORE AT 6 MONTHS FOLLOW UP	92.04	3.86	76.08	5.05	0.001
FAI SCORE AT 6 MONTHS FOLLOW UP	41.10	5.34	68.0	4.00	0.001
PLANTAR FASCIA THICKNESS AT 6 MONTHS FOLLOW UP	3.24	0.431	5.06	0.512	0.001

In the study, the mean VAS score during 6 months follow up in PRP and in corticosteroid groups were 3.50 ± 0.614 and 4.44 ± 0.501 respectively. The mean AOFAS at 6 months follow up in PRP and in corticosteroid groups were 92.04 ± 3.86 and 76.08 ± 5.05 respectively. Mean FAI score at 6 month follow up in PRP and CSI groups were 41.10 ± 5.34 and 68.0 ± 4.0 respectively. Mean thickness of plantar fascia at 6 months follow up in PRP and in corticosteroid groups were 3.24 ± 0.431 and 5.06 ± 0.512 respectively. p value was statistically significant between the groups at final outcomes as p value is less than 0.001.

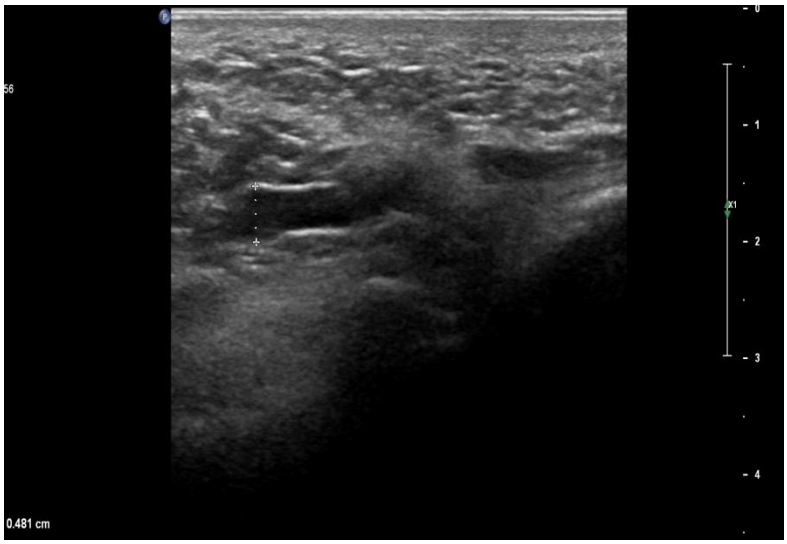
CASE ILLUSTRATION

FIGURE17: ULTRASONOGRAPHY ASSESSMENT OF PLANTAR FASCIA THICKNESS IN PRP GROUP

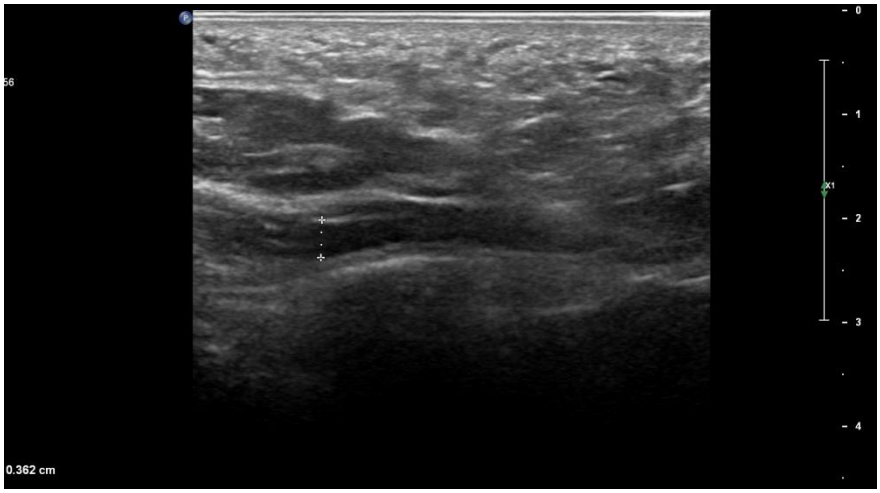
CASE 1



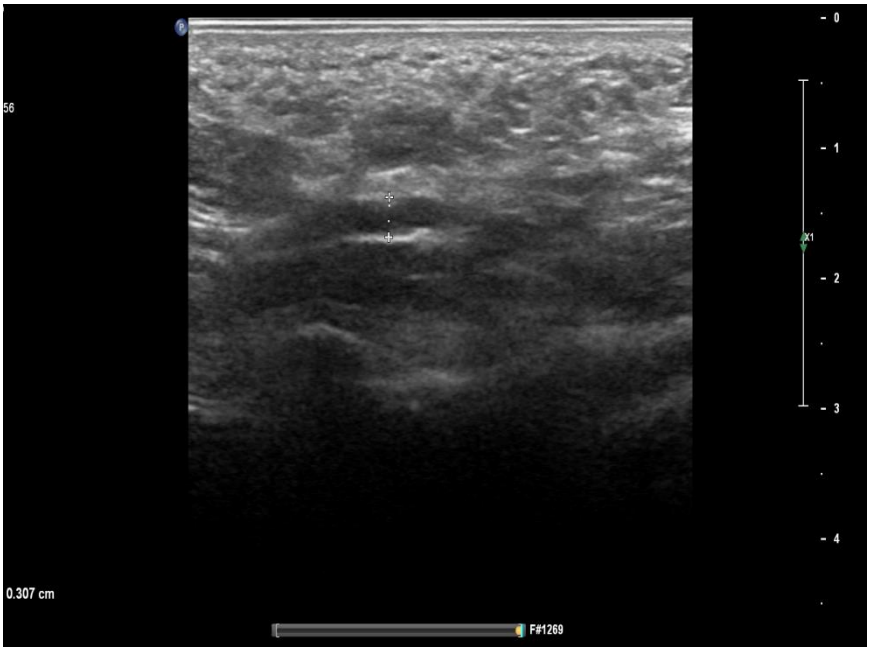
A) PRE-INJECTION PLANTAR FASCIA THICKNESS - 5.77MM



B) AT 1 MONTH PLANTAR FASCIA THICKNESS - 4.81MM



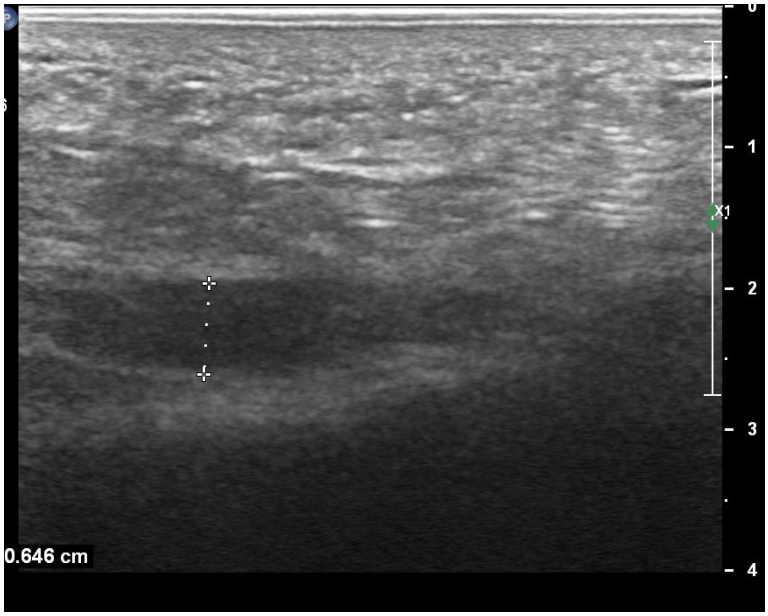
C) AT 3 MONTH PLANTAR FASCIA THICKNESS - 3.62MM



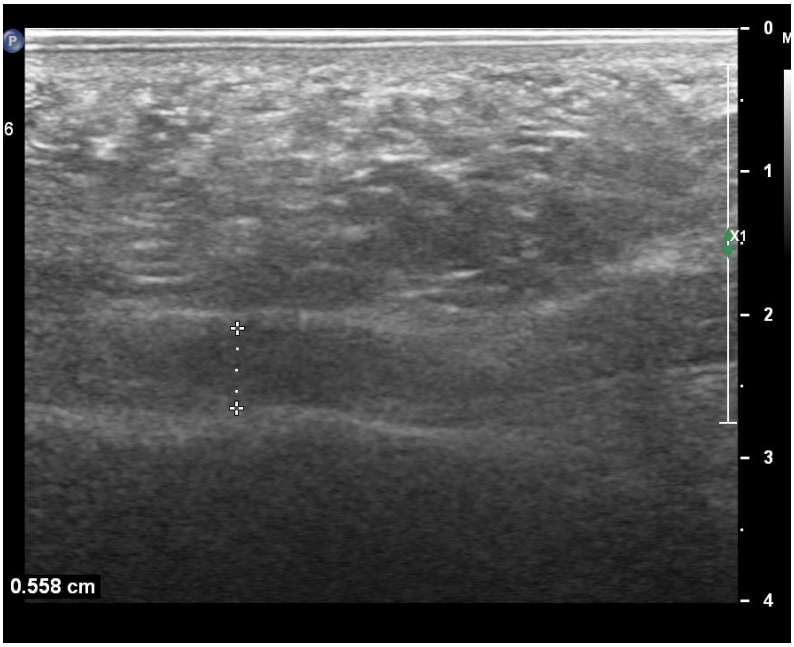
D) AT 6 MONTH PLANTAR FASCIA THICKNESS - 3.07MM

FIGURE18: ULTRASONOGRAPHY ASSESSMENT OF PLANTAR FASCIA THICKNESS IN CS GROUP

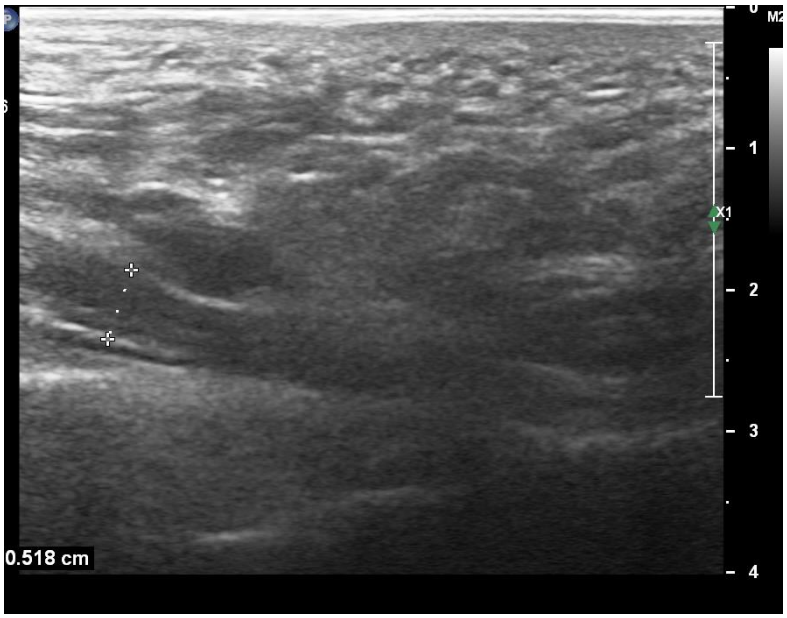
CASE 2



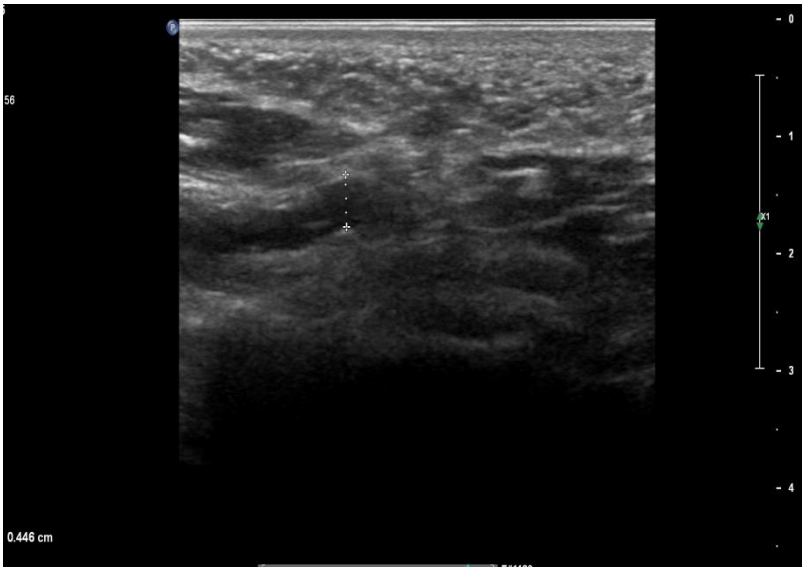
A) PRE - INJECTION PLANTAR FASCIA THICKNESS - 6.46MM



B) AT 1 MONTH PLANTAR FASCIA THICKNESS - 5.58MM



C) AT 3 MONTH PLANTAR FASCIA THICKNESS - 5.18MM



D) AT 6 MONTH PLANTAR FASCIA THICKNESS - 4.81MM

DISCUSSION

DISCUSSION

The aim of this study is to determine the outcome of PRP vs corticosteroid (methyl prednisolone) injection in patients having chronic plantar fasciitis. Plantar fasciitis is a very common musculo-skeletal problem encountered in orthopaedic day-to-day practice. Heel pain or plantar fasciitis, whether acute or chronic, is quite a disabling condition. It certainly affects the day-to-day quality of life of patients.

Many treatment modalities have been in practice. Physiotherapy and bracing have been advised. CSIs have been extensively used. Their efficacy is still conflicting. CSI leads to local and permanent damage to structure of fascia.

With advent of biological treatments in the field of orthopaedics, PRP has been used in many clinical problems viz., wound hemostasis/ healing, augmentation of bone grafts, anterior cruciate ligament injuries and treatment of tendinosis.

In a study by Barett et al among 9 patients, there was complete symptomatic relief after 2 months.[6] In another patient, PRP injection successfully relieved the symptoms.[87] In the study by Mishra et al, of 20 patients, 60% showed improvement in 8 weeks, 81% at 6 months and 93% at 1½ year of follow up.[88] In a study done by Ajit chitre P, of 8 patients, 100% showed improvement in 3 months.[76]

We chose to study patients having chronic plantar fasciitis since it is a very common clinical problem involving the weight bearing portion of the limb.

110 patients were taken for study. There were 10 drop outs in the study. Screening and evaluation was done for 120 painful heels in this study and the patients were followed up. With each follow up, clinical, subjective, radiological and functional outcomes were being

assessed at 1st month, 3rd month, and 6th month by using VAS/FAI and Roles Maudsley Score, AOFAS and Ultrasonogram plantar fascia.

In our study, 59 were females, 41 were males. 1, 63, 36 and 0 patients had BMI in the ranges < 18.5, 18.5 - 24.9, 25-29.9 and 30-34.9 respectively. Most of patients were in the normal weight range of 18.5-24.9, mean BMI being 23.6. Site of injection was unilateral in 80 and bilateral in 20 patients. The mean age groups of patients who were given platelet-rich plasma and CSIs were 46.74 ± 12.45 years and 48.5 ± 10.39 years respectively. There was considerable improvement seen in visual analog score before injection with p value of 0.0486 to VAS score after 1 month, 3 months and 6 months with p value of less than 0.001.

The assessment of clinical outcomes using the mean VAS values before giving injection, at 1 month, 3 months and 6 months in the group which were given PRP were 7.32 ± 0.587, 5.78 ± 0.679, 4.52 ± 0.505, 3.5 ± 0.614 respectively. The mean VAS values before injection, at 1 month, 3 months and 6 months in corticosteroid group were 7.24 ± 0.555, 6.46 ± 0.813, 5.64 ± 0.693, 4.44 ± 0.501 respectively. Hence, significant improvement was seen in PRP injection group.

In the assessment of subjective ratings using Roles Maudsley Score, at 1 month follow up in PRP group was excellent in 10 patients and good in 16 patients and in corticosteroid group was excellent in 17 patients and good in 17 patients. At 3rd month follow up in PRP group, the score was excellent in 17 patients and good in 21 patients and in corticosteroid group, the score was excellent in 0 patient and good in 11 patients. At 6 month follow up in PRP group, the score was excellent in 32 patients and good in 13 patients and in corticosteroid group excellent in 6 patients and good in 2 patients.

While assessing functional outcomes using AOFAS and FAI Score, mean AOFAS of the subjects who were given injections of PRP (pre-injection, 1 month, 3rd month & 6th month) were 59.58, 70.74, 82.20, 92.04 respectively and mean score of AOFAS of the subjects in CSIs (pre-injection, 1st month, 3rd month & 6th month) was 56.62, 64.08, 71.22, 76.08 respectively. p value is statistically significant between the groups (AOFAS at 1st month, 3rd month & 6th month) as p value <0.001.

The mean FAI scores of the subjects in PRP injections group (pre-injection, 1st month, 3rd month & 6th month) were 100.58, 81.54, 61.86, 41.10 respectively and mean FAI scores of the subjects in CSIs group (pre-injection, 1st month, 3rd month & 6th month) were 100.14, 80.84, 73.40, 68.00 respectively. FAI score was statistically significant between groups in 3rd month and 6th month as p value less than 0.001.

On assessing radiological outcomes using plantar fascia thickness measurement, mean thickness of plantar fascia of the patients who were given PRP injections group (pre-injection, 1st month, 3rd month & 6th month) was 6.02, 4.96, 4.06, 3.24 respectively and mean thickness of plantar fascia of the subjects in CSIs group (pre-injection, 1st month, 3rd month & 6th month) was 6.30, 5.28, 5.12, 5.06 respectively. p value is statistically significant between the groups in measuring plantar fascia thickness at 1st month, 3rd month and 6th month as p value is less than 0.001.

Comparing with studies conducted by others, in our study, sample size was higher and we have used four parameters to assess the disease accurately as possible by clinical, subjective, radiological and functional outcomes at 1 month, 3 months, 6 months by the usage of VAS/FAI and Roles Maudsley Score, AOFAS and Ultrasonogram plantar fascia.

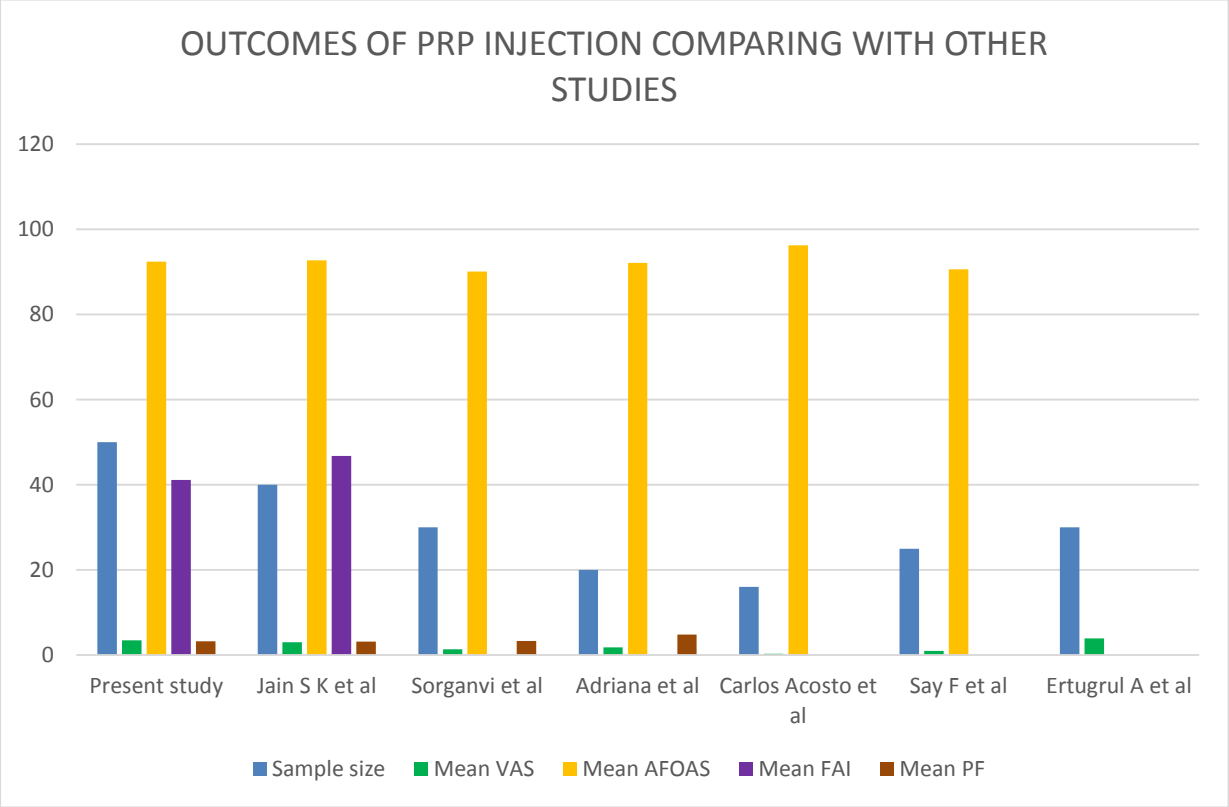
Two other Indian studies are compared. Jain SK et al 2018 found that PRP and corticosteroid were equally effective.[1] In his study he used all four parameters. Sorganavi et al used only AOFAS functional score, though functional and clinical outcomes showed better results in PRP group.[59] Assessing plantar fascia thickness radiologically were almost similar in both PRP and CS injections group. Among American and European studies, Adriana et al compared both PRP and CS injection in PF. But they used only 20 patients in either of the groups with only one functional outcome scale. PF thickness in PRP group was >4.82mm at 6 month follow higher value than normal cut off > 4mm.[117] Among the Asian studies, Say F et al used only 25 patients in each group with only VAS and AOFAS assessment, without radiological assessment of PF thickness.[33] Ertugrul A et al used 30 patients in both the groups, measuring only VAS provided in (Table 16).[26]

In our study, significant improvement was seen in PRP injection group in comparison with CSI group, although steroid injections shows significantly improvement in clinical, subjective rating, functional and radiological outcomes 1 month after injection. However, for long term effects PRP injection gives better results in clinical, subjective rating, functional and radiological outcomes during 6 months when compared to corticosteroid group. Post-operative complications were minimal in PRP group in comparison with corticosteroid group.

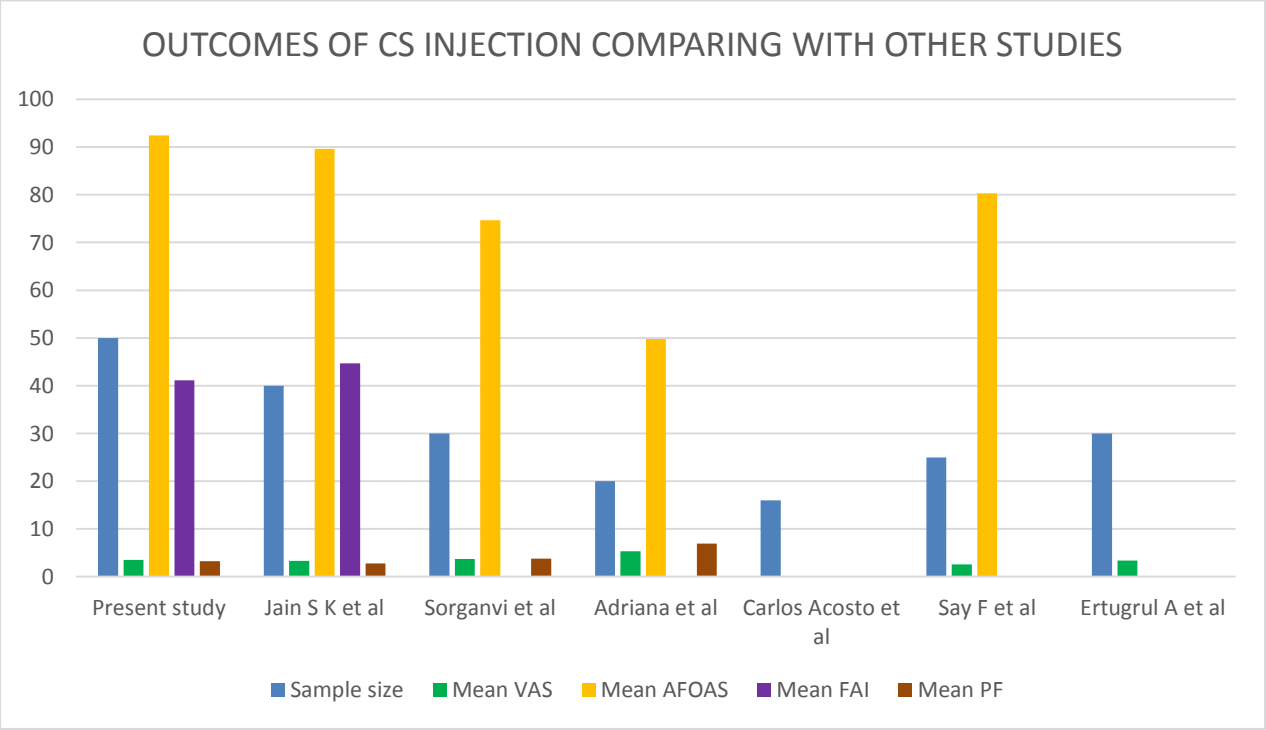
TABLE 16: COMPARISON WITH OTHER STUDIES

	PRESENT STUDY		JAIN SK et al [1]		SORGANVI P et al [59]		ADRIANA EJP et al [117]		SAY F et al [33]		ERTUGRUL AKSAHIN et al [26]	
	PRP	**CS**	**PRP**	**CS**	**PRP**	**CS**	**PRP**	**CS**	**PRP**	**CS**	**PRP**	**CS**
SAMPLE SIZE	50	50	40	40	30	30	20	20	25	25	30	30
MEAN VAS SCORE AFTER INJECTION AT 6 MONTHS	3.5	4.4	3.0	3.3	1.4	1.9	1.8	5.3	1.0	2.6	3.9	3.4
MEAN AOFAS SCORE AFTER INJECTION AT 6 MONTHS	92	76	92.7	89.6	90	74.6	92.1	49.7	90.6	80.3	-	-
MEAN FAI SCORE AFTER INJECTION AT 6 MONTHS	41.1	68	46.8	44.7	-	-	-	-	-	-	-	-
MEAN PLANTAR FASCIA THICKNESS AT 6 MONTHS	3.2	5.06	3.2	2.8	3.3	3.7	4.82	6.90	-	-	-	

"-" parameter not mentioned in the study.



GRAPH 14: BAR DIAGRAM SHOWING OUTCOMES OF PRP INJECTION COMPARING WITH OTHER STUDIES



GRAPH 15: BAR DIAGRAM SHOWING OUTCOMES OF CS INJECTION COMPARING WITH OTHER STUDIES

TABLE 17: TREATMENT PLAN FOR PLANTAR FASCIITIS

Based on analysis of observation from our study, we suggest the following treatment plan based on degree of disability as assessed by the scoring below could be considered.

CLASS	DESCRIPTION	CLINICAL RATING (VAS) SCALE	RADIOLOGICAL ASSESSMENT (PLANTAR FASCIA THICKNESS)	TREATMENT
I	>3 month symptom duration + some discomfort following activity	1-5	4 to </=5 mm	Observation
II	>3 month symptom duration +failed conservative+ some discomfort following activity	6-8	>5.1 to 7 mm	PRP Injections + Stretching and strengthening exercise of plantar fascia

VAS score more than or equal to 8 and plantar fascia thickness >7mm - PRP injection with stretching exercise found to be less effective. Patient needs surgical intervention.

CONCLUSION

CONCLUSION

The aim of this study was to compare the efficacy of local injection of PRP with corticosteroid (methyl prednisolone) in patients with chronic plantar fasciitis and to evaluate safety, side effect profile and complications of the two different modalities of treatment.

Plantar fasciitis is a common devastating foot problem. The advent of other modes of treatment started from the late 19th century. Once the conservative treatments have failed, other methods are required. NSAIDS are helpful only in acute cases. For patients who do not tolerate NSAIDS, local steroid injection could be used for both therapeutic and diagnostic intervention.

PRP is a biological option for a common and recalcitrant Orthopaedic problem like heel pain/ plantar fasciitis. In our study a satisfactory number of patients showed improvement in symptoms in PRP group with minimal complications. Continued symptomatic relief enabled the patients to perform their daily activities.

110 patients were treated in this study. PRP injection was given for 55 patients and the remaining 55 received CSI. There were 10 drop outs. There were 59 females and 41 males. 80 received unilateral injection and 20 received injection in both the heels. Significant improvement is seen in clinical, subjective, functional and radiological outcomes at 6 months follow up in PRP injection group in comparison with CSI group with minimal complications.

With the experience and evidence from this study, PRP injection is a superior alternative for the existing methods to treat chronic plantar fasciitis. With proper patient selection and injection, patients having plantar fasciitis can return to pre-disease life.

Our study findings prove that PRP is the good method of management in patients of chronic plantar fasciitis while considering AOFAS, FAI score and Roles Maudsley Score and in

patients presenting with some discomfort following activity, with more than 3 month symptom duration, with VAS score of more than 6 and plantar fascia thickness 5mm and failed conservative management.

This study has shown better results with PRP injection compared with local steroid infiltration. This is largest case series studied compared to any other studies available in the literature.

This research was constrained by a restricted patient population, a brief follow up and a lack of control group. A randomized controlled trial with a larger population, a longer follow up, and a control group would provide a clearer insight into the effectiveness of both treatment types.

The combination of the short-term effect of steroid with the long-term effect of PRP is certainly interesting; however, its pharmacological viability is yet to be elucidated.

SUMMARY

SUMMARY

In our study of 110 patients (following 11% dropouts in the study) having chronic plantar fasciitis treated using PRP and corticosteroid (methyl prednisolone) injections, the following conclusions were drawn.

This is the only study conducted in more than 100 patients of chronic plantar fasciitis in rural population with four parameters (VAS, AOFAS, FAI, USG plantar fascia thickness) unlike other studies using either one or two of the above parameters.

A. People over 4^{th} decade were found to be more prone to get plantar fasciitis in our study population. Female preponderance was noted in the study.
B. In literature, it was stated that obese or overweight more prone to develop chronic plantar fasciitis, but in this study people's mean BMI was 23.6. This could be due to lower incidence of obesity due to lower socioeconomic strata in our rural population.
C. Proper patient selection meeting our criteria is essential for better treatment outcome.
D. In our study we have used clinical, subjective, functional, radiological outcomes unlike other studies in plantar fasciitis patients, for better knowing the disease progression and treatment plan.
E. Proper diagnosing of plantar fasciitis and identifying maximum area of tenderness is essential for final outcome.
F. Stretching and strengthening of plantar fascia exercise following injection is started as our post injection protocol, instead of using any orthoses.
G. Mean VAS showed better improvement in patients who received platelet- rich plasma in comparison with corticosteroid group.
H. Subjective rating using Roles Maudsley Score showed better short-term outcomes in corticosteroid group. PRP group showed better long-term results.

I. AOFAS score rises with improvement in function.

J. FAI score decreases with improvement in plantar fasciitis.

K. Radiological assessment of PF thickness showed much improved results in patients who received PRP injections. PF in PRP injection group showed better score at 6 months follow up when compared to CSI group.

L. Patients who were given PRP had fewer complications when compared to CSIs group. Two patients with infection (superficial) in PRP group healed rapidly without any antibiotic administration when compared to five patients with infection (superficial) in corticosteroid group who required oral antibiotic administration following culture and sensitivity. Infection subsided for patients in both the groups on subsequent follow up.

M. In our study population, 15 patients had type II diabetes mellitus and 11 had systemic hypertension. Three patients had both diabetes and hypertension. In corticosteroid injection (methyl prednisolone) group, five patients developed infection as complication, of which three patients had type II diabetes mellitus.

N. Three patients developed skin depigmentation and two patients had atrophy of fat pad with CSI.All five patients were tracked before final follow up. The size of skin depigmentation and fat pad atrophy remain the same. No worsening of the condition was found in any of these patients.

O. CSIs showed good short-term results, but for good results over long-term, PRP is better with respect to all four parameters (VAS, AOFAS, FAI, USG Plantar Fascia thickness) assessed in this study.

Thus, PRP helps to avoid surgery in managing chronic plantar fasciitis in our rural study population.

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Conflict of Interest There is no conflict of interest to disclose.

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ANNEXURES

INFORMED CONSENT

STUDY TITLE: A PROSPECTIVE STUDY COMPARING THE EFFICACY OF LOCAL INJECTION OF PLATELET-RICH PLASMA VS METHYL PREDNISOLONE IN PLANTAR FASCIITIS

Chief researcher/ PG guide's name: Dr. Manohar P V

Principal investigator: Dr. Kishore V

Name of the subject:

Age:

Gender:

Address:

I have been informed in my own language that this study involves x-ray, blood investigation, injection procedure and regular follow up. I have been explained thoroughly the nature and risks involved like rupture of plantar fascia, infection, skin depigmentation, peripheral nerve injury, muscle damage, post injection flare and fat pad atrophy during and after the procedure have been explained to me in my own vernacular language, to my satisfaction.

I understand that the medical information produced by this study will become part of institutional record and will be kept confidential by the said institute.

I understand that my participation is voluntary and may refuse to participate or may withdraw my consent and discontinue participation at any time without prejudice to my present or future care at this institution.

I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose.

I confirm that **Dr Manohar P V / Dr Kishore V** (Chief researcher /name of PG guide and principal investigator) has explained to me purpose of research and the study procedure that will undergo and the possible risks and discomforts that may experience, in my own language. I hereby agree to give valid consent to participate as a subject in this research project. The total treatment costs will be borne by the investigator. Even though we withdraw from the study effective treatment will be provided.

Date:

Signature of the Patient/Guardian:

Thumb Impression of the Patient/Guardian:

Signature of the witness:

1)

2)

I have explained to ---------- (Patient) the purpose of the research , the possible risk and benefits to the best of my ability.

Chief researcher/ Guide signature:

Date:

ಮಾಹಿತಿ ಸಮ್ಮತಿ ನಮೂನೆ

ಶೀರ್ಷಿಕೆ : ಸ್ಥಳೀಯ ಚುಚ್ಚುಮದ್ದಿನ ಪರಿಣಾಮಕಾರಿತ್ವ ಪ್ಲೇಟ್ಲೆಟ್ ರಿಚ್ ಪ್ಲಾಸ್ಮಾ ಜೊತೆ ಕೊರ್ಟಿಕೊಸ್ಟೆರಾಯಿಡ್ಗಳು ಪ್ಲ್ಯಾಂಟರ್ ಫ್ಯಾಸಿಟಿಸ್‌ನಲ್ಲಿ ಹೋಲಿಕೆ ಮಾಡುವ ಪ್ರಾಯೋಗಿಕ ಅಧ್ಯಯನ

ಮುಖ್ಯ ಸಂಶೋಧಕ/ ಸ್ನಾತಕೋತ್ತರ ಮಾರ್ಗದರ್ಶಕರ ಹೆಸರು: ಡಾ.ಪಿ.ವಿ.ಮನೋಹರ್ .

ಪ್ರಧಾನ ಸಂಶೋಧಕ: ಡಾ.ಕಿಶೋರ್ ವಿ.

ಪ್ರಯೋಗಾರ್ಥಿಯ ಹೆಸರು :

ವಯಸ್ಸು :

ಲಿಂಗ :

ವಿಳಾಸ:

ಈ ಅಧ್ಯಯನವು ಕ್ಷ-ಕಿರಣ ಮತ್ತು ರಕ್ತ ಪರಿಶೋಧನೆ, ಚುಚ್ಚುಮದ್ದಿನ ಕಾರ್ಯವಿಧಾನ ಮತ್ತು ನಿಯಮಿತ ಅನುಸರಣೆಯನ್ನು ಒಳಗೊಂಡಿದೆ ಎಂದು ನನ್ನ ಸ್ವಂತ ಭಾಷೆಯಲ್ಲಿ ನನಗೆ ತಿಳಿಸಲಾಗಿದೆ. ಪ್ಲಾಂಟರ್ ಫಾಸಿಯಾ, ಸೋಂಕು, ಚರ್ಮದ ವರ್ಣ ದ್ರವ್ಯ ಬದಲಾವಣೆ, ಪೆರಿಫೆರಲ್ ನರದ ಗಾಯ, ಸ್ನಾಯು ಹಾನಿ, ಚುಚ್ಚುಮದ್ದಿನ ನಂತರದ ಉರಿ, ಮತ್ತು ಕೊಬ್ಬಿನ ಪ್ಯಾಡ್ ಅಟ್ರೋಫಿಯಂತಹ ಪ್ರಕೃತಿ ಮತ್ತು ಅಪಾಯಗಳನ್ನು ನಾನು ಸಂಪೂರ್ಣವಾಗಿ ವಿವರಿಸಿದ್ದೇನೆ- ನನ್ನ ಸ್ವಂತ ಅರ್ಥವಾಗುವ ಭಾಷೆಯಲ್ಲಿ ವಿವರಿಸಲಾಗಿದೆ,

ಅಧ್ಯಯನದ ಸಮಯದಲ್ಲಿ ಕಂಡುಬರುವ ನನ್ನ ಎಲ್ಲಾ ವಿವರಗಳನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗಿದೆ ಮತ್ತು ಸಂಶೋಧನೆಗಳನ್ನು ಪ್ರಕಟಿಸುವಾಗ ಅಥವಾ ಹಂಚಿಕೊಳ್ಳುವಾಗ, ನನ್ನ ವಿವರಗಳನ್ನು ಮರೆಮಾಚಲಾಗುತ್ತದೆ ಎಂದು ನಾನು ಅರ್ಥಮಾಡಿಕೊಂಡಿದ್ದೇನೆ.

ಈ ಅಧ್ಯಯನದಲ್ಲಿ ನನ್ನ ಭಾಗವಹಿಸುವಿಕೆಯು ಸಂಪೂರ್ಣವಾಗಿ ಸ್ವಯಂಪ್ರೇರಿತವಾಗಿದೆ ಎಂದು ನನಗೆ ವಿವರಿಸಲಾಗಿದೆ, ಮತ್ತು ನಾನು ಯಾವುದೇ ಸಮಯದಲ್ಲಿ ಅಧ್ಯಯನದಿಂದ ಹಿಂದೆ ಸರಿಯಬಹುದು ಮತ್ತು ಇದು ನನ್ನ ವೈದ್ಯರೊಂದಿಗಿನ ನನ್ನ ಸಂಬಂಧ ಅಥವಾ ನನ್ನ ಕಾಯಿಲೆಗೆ ಚಿಕಿತ್ಸೆಯ ಮೇಲೆ ಪರಿಣಾಮ ಬೀರುವುದಿಲ್ಲ.

ಈ ಅಧ್ಯಯನದಿಂದ ಉದ್ಭವಿಸುವ ಯಾವುದೇ ದತ್ತಾಂಶ ಅಥವಾ ಫಲಿತಾಂಶಗಳ ಬಳಕೆಯನ್ನು ನಿರ್ಬಂಧಿಸಲು ನಾನು ಒಪ್ಪುತ್ತೇನೆ, ಅಂತಹ ಬಳಕೆಯು ಕೇವಲ ವೈಜ್ಞಾನಿಕ ಉದ್ದೇಶಕ್ಕಾಗಿ ಮಾತ್ರ.

ಡಾ. ಮನೋಹರ್ ಪಿ ವಿ / ಡಾ.ಕಿಶೋರ್ V (ಮುಖ್ಯ ಸಂಶೋಧಕ /ಪಿಜಿ ಮಾರ್ಗದರ್ಶಕರ ಹೆಸರು ಮತ್ತು ಮುಖ್ಯ ಪರಿಶೋಧಕರ ಹೆಸರು) ಸಂಶೋಧನೆಯ ಉದ್ದೇಶ ಮತ್ತು ಅಧ್ಯಯನ ಕಾರ್ಯವಿಧಾನದ ಉದ್ದೇಶ ಮತ್ತು ನನ್ನ ಭಾಷೆಯಲ್ಲಿ, ಅನುಭವಕ್ಕೆ ಬರುವ ಸಂಭಾವ್ಯ ಅಪಾಯಗಳು ಮತ್ತು ಅನಾನುಕೂಲತೆಗಳನ್ನು ನನಗೆ ವಿವರಿಸಬಹುದೆಂದು ನಾನು ದೃಢೀಕರಿಸುತ್ತೇನೆ. ಈ ಸಂಶೋಧನಾ ಯೋಜನೆಯಲ್ಲಿ ಪ್ರಯೋಗಾರ್ಥಿಯಾಗಿ ಭಾಗವಹಿಸಲು ಮಾನ್ಯ ಸಮ್ಮತಿಯನ್ನು

ನೀಡಲು ನಾನು ಇಲ್ಲಿ ಒಪ್ಪುತ್ತೇನೆ. ಒಟ್ಟು ಚಿಕಿತ್ಸಾ ವೆಚ್ಚಗಳನ್ನು ಪರಿಶೋಧಕರು ಭರಿಸುತ್ತಾರೆ. ಅಧ್ಯಯನದಿಂದ ನಾವು ಹಿಂದೆ ಸರಿದರೂ ಪರಿಣಾಮಕಾರಿ ಚಿಕಿತ್ಸೆಯನ್ನು ನೀಡಲಾಗುವುದು

ದಿನಾಂಕ :

ರೋಗಿ/ಪಾಲಕರ ಸಹಿ:

ರೋಗಿಯ ಹೆಬ್ಬೆರಳು ಗುರುತು/ಗಾರ್ಡಿಯನ್ :

ಸಾಕ್ಷಿಯ ಸಹಿ :

1)

2)

ನಾನು ---------- (ರೋಗಿಯ) ಸಂಶೋಧನೆಯ ಉದ್ದೇಶವನ್ನು ವಿವರಿಸುತ್ತೇನೆ - ಸಂಭಾವ್ಯ ಅಪಾಯ ಮತ್ತು ಪ್ರಯೋಜನಗಳು ನನ್ನ ಸಾಮರ್ಥ್ಯದ ಅತ್ಯುತ್ತಮ

ಮುಖ್ಯ ಸಂಶೋಧಕ/ ಮಾರ್ಗದರ್ಶಕರು ಹಸ್ತಾಕ್ಷರ :

ದಿನಾಂಕ :

PATIENT INFORMATION SHEET

STUDY TITLE: A PROSPECTIVE STUDY COMPARING THE EFFICACY OF LOCAL INJECTION OF PLATELET-RICH PLASMA (PRP) VS METHYL PREDNISOLONE IN PLANTAR FASCIITIS.

STUDY SITE: R.L Jalappa hospital, Tamaka, Kolar.

Aim: To Compare the efficacy of local injection of platelet-rich plasma and corticosteroid (methyl prednisolone) in patients with chronic plantar fasciitis. To evaluate safety, side effects and complications of the two modalities of treatment.

Patient with chronic plantar fasciitis will be selected.

Please read the following information and discuss with your family members. You can ask any question regarding the study. If you agree to participate in this study we will collect information (as per proforma) from you. Routine (CBC, BT, CT, RBS, SERUM UREA/CREATININE) and relevant blood investigations, radiological investigation will be carried out if required. This information collected will be used for dissertation and publication only.

All information collected from you will be kept confidential and will not be disclosed to any outsider. Your identity will not be revealed. This study has been reviewed by the Institutional Ethics Committee and you are free to contact the member of the Institutional Ethics Committee. There is no compulsion to agree to this study. The care you get will not change if you don‘t wish to participate. You are required to sign/ provide thumb impression only if you

voluntarily agree to participate in this study.

For any further clarification you can contact the study investigator:

Dr. Kishore V

Mobile no: 08903424218

E-mail id: kishorembbs13@gmail.com

ಶ್ರೀ ದೇವರಾಜ ಅರಸು ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನಾ ಅಕಾಡೆಮಿ,

ಟಮಕ, ಕೋಲಾರ - 563101 .

ರೋಗಿ ಮಾಹಿತಿ ಹಾಳೆ

ಅಧ್ಯಯನ ಶೀರ್ಷಿಕೆ: : ಸ್ಥಳೀಯ ಚುಚ್ಚುಮದ್ದಿನ ಪರಿಣಾಮಕಾರಿತ್ವ ಪ್ಲೇಟ್ಲೆಟ್ ರಿಚ್ ಪ್ಲಾಸ್ಮಾ (ಪಿಆರ್‌ಪಿ) ಜೊತೆ ಕೊರ್ಟಿಕೊಸ್ಟೆರಾಯಿಡ್ಗಳು ಪ್ಲ್ಯಾಂಟರ್ ಫ್ಯಾಸಿಟಿಸ್‌ನಲ್ಲಿ ಹೋಲಿಕೆ ಮಾಡುವ ಪ್ರಾಯೋಗಿಕ ಅಧ್ಯಯನ

ಅಧ್ಯಯನ ಸ್ಥಳ: ಆರ್.ಎಲ್.ಜಾಲಪ್ಪ ಆಸ್ಪತ್ರೆ ಮತ್ತು ಸಂಶೋಧನಾ ಕೇಂದ್ರ, ಕೋಲಾರದ ಟಮಕ.

ಗುರಿ

1. ದೀರ್ಘಕಾಲದ ಪ್ಲ್ಯಾಂಟರ್ ಫ್ಯಾಸಿಟಿಸ್ ರೋಗಿಗಳಲ್ಲಿ ಪ್ಲೇಟ್‌ಲೆಟ್ ಸಮೃದ್ಧ ಪ್ಲಾಸ್ಮಾ ಮತ್ತು ಕಾರ್ಟಿಕೊಸ್ಟೆರಾಯ್ಡ್‌ನ ಸ್ಥಳೀಯ ಚುಚ್ಚುಮದ್ದಿನ ಪರಿಣಾಮಕಾರಿತ್ವವನ್ನು ಹೋಲಿಸುವುದು.

2. ಚಿಕಿತ್ಸೆಯ ಸುರಕ್ಷತೆಗಾಗಿ ಅಡ್ಡಪರಿಣಾಮ ಮತ್ತು ತೊಡಕುಗಳನ್ನು ಮೌಲ್ಯಮಾಪನ ಮಾಡಲು ಎರಡು ವಿಭಿನ್ನ ಚಿಕಿತ್ಸೆಯ ವಿಧಾನಗಳಲ್ಲಿ,

ದಯವಿಟ್ಟು ಈ ಕೆಳಗಿನ ಮಾಹಿತಿಯನ್ನು ಓದಿ ಮತ್ತು ನಿಮ್ಮ ಕುಟುಂಬ ಸದಸ್ಯರೊಂದಿಗೆ ಚರ್ಚಿಸಿ. ಅಧ್ಯಯನಕ್ಕೆ ಸಂಬಂಧಿಸಿದಂತೆ ನೀವು ಯಾವುದೇ ಪ್ರಶ್ನೆಯನ್ನು ಕೇಳಬಹುದು. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಒಪ್ಪಿದರೆ ನಾವು ನಿಮ್ಮಿಂದ ಮಾಹಿತಿಯನ್ನು ಸಂಗ್ರಹಿಸುತ್ತೇವೆ (ಪ್ರೊಫಾರ್ಮಾದ ಪ್ರಕಾರ). ನಿಯತಕ್ರಮ (ಸಿಬಿಸಿ, ಬಿಟಿ, ಸಿಟಿ, ಆರ್ಬಿಎಸ್, ಸೀರಮ್ ಯೂರಿಯಾ / ಕ್ರಿಯೇಟಿನೈನ್) ಮತ್ತು ಸಂಬಂಧಿತ ರಕ್ತ ತನಿಖೆ, ಅಗತ್ಯವಿದ್ದರೆ ವಿಕಿರಣಶಾಸ್ತ್ರದ ತನಿಖೆ

ನಡೆಸಲಾಗುತ್ತದೆ. ನಿಮ್ಮಿಂದ ಸಂಗ್ರಹಿಸಿದ ಈ ಮಾಹಿತಿಯನ್ನು ಪ್ರಬಂಧ ಮತ್ತು ಪ್ರಕಟಣೆಗೆ ಮಾತ್ರ ಬಳಸಲಾಗುತ್ತದೆ.

ನಿಮ್ಮಿಂದ ಸಂಗ್ರಹಿಸಲಾದ ಎಲ್ಲಾ ಮಾಹಿತಿಯನ್ನು ಗೌಪ್ಯವಾಗಿಡಲಾಗುತ್ತದೆ ಮತ್ತು ಯಾವುದೇ ಹೊರಗಿನವರಿಗೆ ಬಹಿರಂಗಪಡಿಸುವುದಿಲ್ಲ. ನಿಮ್ಮ ಗುರುತು ಬಹಿರಂಗಗೊಳ್ಳುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನವನ್ನು ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಸಮಿತಿಯು ಪರಿಶೀಲಿಸಿದೆ ಮತ್ತು ಸಾಂಸ್ಥಿಕ ನೈತಿಕ ಸಮಿತಿಯ ಸದಸ್ಯರನ್ನು ಸಂಪರ್ಕಿಸಲು ನೀವು ಮುಕ್ತರಾಗಿದ್ದೀರಿ. ಈ ಅಧ್ಯಯನವನ್ನು ಒಪ್ಪಿಕೊಳ್ಳಲು ಯಾವುದೇ ಬಲವಂತವಿಲ್ಲ. ನೀವು ಭಾಗವಹಿಸಲು ಇಚ್ಛಿಸದಿದರೆ ನೀವು ಪಡೆಯುವ ಆರೈಕೆಯಲ್ಲಿ ಯಾವುದೇ ರೀತಿಯ ಬದಲಾಗುವುದಿಲ್ಲ. ಈ ಅಧ್ಯಯನದಲ್ಲಿ ಭಾಗವಹಿಸಲು ನೀವು ಸ್ವಯಂಪ್ರೇರಣೆಯಿಂದ ಒಪ್ಪಿಕೊಂಡರೆ ಮಾತ್ರ ನೀವು ಹೆಬ್ಬೆರಳು ಅನಿಸಿಕೆ ಸಹಿ / ಒದಗಿಸುವ ಅಗತ್ಯವಿದೆ.

ಯಾವುದೇ ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ನೀವು ಅಧ್ಯಯನ ತನಿಖಾಧಿಕಾರಿಯನ್ನು ಸಂಪರ್ಕಿಸಬಹುದು:

ಡಾ. ಕಿಶೋರ್ ವಿ

ಮೊಬೈಲ್ ಸಂಖ್ಯೆ: 08903424218

ಇ-ಮೇಲ್ ಐಡಿ: kishorembbs13@gmail.com

PROFORMA

1. GENERAL

Name of patient:

Hospital number:

Date of examination:

Age:

Gender:

Occupation:

Diagnosis:

Chief complaints:

History of presenting illness:

Past history: K/C/O Diabetes Mellitus/ Hypertension/Asthma/Tuberculosis/Thyroid disorders/Others

Family history:

General Physical examination:

Vitals signs:

BP - mmHg

RR - cpm

PR - /min

Temperature:

Systemic examination:

CVS -

RS -

PA -

CNS -

Clinical examination:

2. HAEMATOLOGICAL INVESTIGATIONS:

1. Hemoglobin
2. Bleeding time
3. Clotting time
4. Blood sugar
5. Serum urea
6. Serum creatinine

RADIOLOGICAL FINDINGS:

1.) X-ray findings:

TREATMENT GIVEN:

3.ASSESSMENT:

	PRE - INJECTION	**1ST MONTH**	**3RD MONTH**	**6TH MONTH**
VISUAL ANALOG SCALE				
ROLES MAUDSLEY SCORE				
FOOT AND ANKLE OUTCOME INSTRUMENT CORE SCALE				
AMERICAN ORTHOPAEDIC FOOT AND ANKLE HINDFOOT SCALE				
ULTRASONOGRAPHY PLANTAR FASCIA				

4. COMPLICATIONS :

PATIENT

SIGNATURE

DOCTOR

SIGNATURE

VISUAL ANALOG SCALE

NAME:

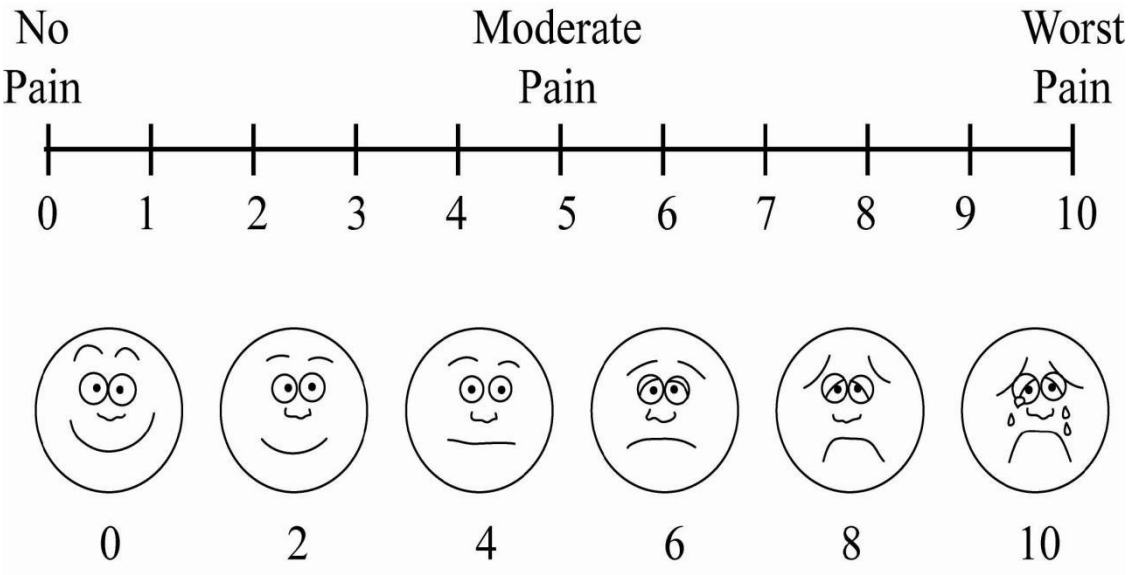
AGE:

SEX:

HOSPITAL NO:

REMARKS:

SIGNATURE:



ROLES MAUDSLEY SCORE

NAME:

AGE:

SEX:

HOSPITAL NO:

REMARKS:

SIGNATURE:

	Point	Interpretation
Excellent	1	No pain, full movement and activity
Good	2	Occasional discomfort, full movement and activity
Fair	3	Some discomfort after prolonged activity
Poor	4	Pain-limiting activities

Foot and Ankle Questionnaire

Instructions

Please answer the following questions for the foot/ankle being treated or followed up. If it is BOTH feet/ankles, please answer the questions for your **worse** side. All questions are about how you have felt, on average, during the **past week**. If you are being treated for an injury that happened less than one week ago, please answer for the period since your injury.

1. During the **past week**, how **stiff** was your foot/ankle? (Circle one response.)

1 Not at all 2 Mildly 3 Moderately 4 Very 5 Extremely

2. During the **past week**, how **swollen** was your foot/ankle? (Circle one response.)

1 Not at all 2 Mildly 3 Moderately 4 Very 5 Extremely

During the **past week**, please tell us about how painful your foot/ankle was during the following activities. (Circle ONE response on each line that best describes your average ability.)

	Not painful	Mildly painful	Moderately painful	Very painful	Extremely painful	Could not do because of foot/ankle pain	Could not do for other reasons
3. Walking on **uneven** surfaces?	1	2	3	4	5	6	7
4. Walking on **flat** surfaces?	1	2	3	4	5	6	7
5. Going up or down stairs?	1	2	3	4	5	6	7
6. Lying in bed at night?	1	2	3	4	5	6	7

During the **past week**, did your foot/ankle **give way** during the following activities. (Circle ONE response on each line that best describes you for each activity level.)

	Did not give way at all	Partially gave way, but I did not fall	Completely gave way, so that I fell	Could not do the activity because of foot/ankle giving way	Could not do for other reasons
7. Strenuous activity, such as heavy physical work, skiing, tennis?	1	2	3	4	5
8. Moderate activity, such as moderate physical work, jogging, running?	1	2	3	4	5
9. Light activity, such as walking, house work, yard work?	1	2	3	4	5

10. Which of the following statements **best** describes your ability to get around most of the time during the **past week**? (Circle one response.)

1 I did not need support or assistance at all.
2 I mostly walked without support or assistance.
3 I mostly used one cane or crutch to help me get around
4 I mostly used two canes, two crutches or a walker to help me get around.
5 I used a wheelchair.
6 I mostly used other supports or someone else had to help me get around.
7 I was unable to get around at all.

Foot and Ankle Questionnaire

11. How much trouble did you have with balance during the **past week**? (Circle one response.)

1 No trouble at all
2 A little bit of trouble
3 A moderate amount of trouble
4 Quite a bit of trouble
5 A great amount of trouble
6 I cannot balance on my feet at all

12. How difficult was it for you to put on or take off socks/stockings during the **past week**? (Circle one response.)

1 Not at all difficult 2 A little bit difficult 3 Moderately difficult 4 Very difficult 5 Extremely difficult 6 Cannot do it at all

All questions are about how you have felt on average **during the past week**.

During the **past week**, please tell us about how **painful** your **foot or ankle** was when you were performing the following activities. (Circle ONE response on each line that best describes your average ability.)

	No pain	Mild pain	Moderate pain	Severe pain	Extreme pain	Could not do because of foot/ankle pain	Could not do for other reasons
13. Strenuous activity, such as heavy physical work, skiing, tennis	1	2	3	4	5	6	7
14. Moderate activity, such as moderate physical work, jogging, running	1	2	3	4	5	6	7
15. Light activity, such as walking, house work, yard work	1	2	3	4	5	6	7
16. Standing for an hour	1	2	3	4	5	6	7
17. Standing for a few minutes	1	2	3	4	5	6	7

18. How much difficulty do you have walking on uneven surfaces (eg., small stones, rocks, sloping ground)? (Circle one response.)

1 No difficulty
2 Mild difficulty
3 Moderate difficulty
4 Severe difficulty
5 Extreme difficulty
6 Cannot do because of foot/ankle
7 Cannot do for other reasons

Foot and Ankle Questionnaire

What types of shoes can you wear comfortably?
(Circle one response on each line.)

	Yes	No	Not applicable
19. Any women's shoe (including high heels) OR any men's shoe (including fancy dress shoes)	1	2	3
20. Most women's dress shoes (except high heels) OR most means dress shoes	1	2	3
21. Sneakers, walking, or casual shoes	1	2	3
22. Orthopaedic or prescription shoes	1	2	3
23. All shoes	1	2	3

24. How much did your foot or ankle problem interfere with your normal work, including work both outside the home and house work? (Circle one response.)

1 Not at all 2 A little bit 3 Moderately 4 Quite a bit 5 Extremely 6 Unable to work due to foot and ankle problems

25. How much did your foot or ankle problem interfere with your life and your ability to do what you want? (Circle one response.)

1 Not at all 2 A little bit 3 Moderately 4 Quite a bit 5 Extremely 6 It ruins everything

Ankle-Hindfoot Scale (100 Points Total)

Pain (40 points)	
None	40
Mild, occasional	30
Moderate, daily	20
Severe, almost always present	0
Function (50 points)	
Activity limitations, support requirement	
No limitations, no support	10
No limitation of daily activities, limitation of recreational activities, no support	7
Limited daily and recreational activities, cane	4
Severe limitation of daily and recreational activities, walker, crutches, wheelchair, brace	0
Maximum walking distance, blocks	
Greater than 6	5
4-6	4
1-3	2
Less than 1	0
Walking surfaces	
No difficulty on any surface	5
Some difficulty on uneven terrain, stairs, inclines, ladders	3
Severe difficulty on uneven terrain, tairs,inclines,ladders	0
Gait abnormality	
None, slight	8
Obvious	4
Marked	0
Sagittal motion (flexion plus extension)	
Normal or mild restriction (30° or more)	8
Moderate restriction (15°-29°)	4
Severe restriction (less than 150)	0
Hindfoot motion (inversion plus eversion)	
Normal or mild restriction (75%-100% normal)	6
Moderate restriction (25%-74% normal)	3
Marked restriction (less than 25% normal)	0
Ankle-hindfoot stability (anteroposterior,varus-valgus)	
Stable	8
Definitely unstable	0
Alignment (10 points)	
Good, plantigrade foot, midfoot well aligned	15
Fair, plantigrade foot, some degree of midfoot malalignment observed, no symptoms	8
Poor, nonplantigrade foot, severe malalignment, symptoms	0
Total=	100

American Orthopaedic Foot and Ankle Society
From: http://www.aofas.org/i4a/pages/index.cfm?pageid=3494

KEY TO MASTER CHART

- SL NO — SERIAL NUMBER
- UHID — UNIVERSAL HOSPITAL IDENTIFICATION NUMBER
- GENDER
  - M — MALE
  - F — FEMALE
- INJECTION PROCEDURE
  - PRP — P
  - METHYL PREDNISOLONE (CORTICOSTEROID) — C
- GROUP
  - GROUP 1 — PRP
  - GROUP 2 — CORTICOSTEROID (METHYL PREDNISOLONE)
- SIDE
  - U — UNILATERAL
  - B — BILATERAL
- COMORBIDITIES
  - TYPE II DIABETES MELLITUS — DM
  - SYSTEMIC HYPERTENSION — HTN
  - BOTH DIABETES MELLITUS & HYPERTENSION — DM, HTN
  - NO COMORBIDITIES — NIL
- PRE INJECTION VAS — VISUAL ANALOG SCALE BEFORE INJECTION
  - VAS 1MON — VISUAL ANALOG SCALE AT 1 MONTH
  - VAS 3 MON — VISUAL ANALOG SCALE AT 3 MONTHS
  - VAS 6 MON — VISUAL ANALOG SCALE AT 6 MONTHS
- ROLES 1MON — ROLES MAUDSLEY SCORE AT 1 MONTH
  - ROLES 3 MON — ROLES MAUDSLEY SCORE AT 3 MONTHS
  - ROLES 6 MON — ROLES MAUDSLEY SCORE AT 6 MONTHS
- ROLES MAUDSLEY SCORE
  - E — EXCELLENT

G	GOOD
F	FAIR
P	POOR
• PRE INJECTION AOFAS	AMERICAN ORTHOPAEDIC AND ANKLE SOCIETY & ANKLE-HIND FOOT SCALE BEFORE INJECTION
AOFAS 1 MON	AMERICAN ORTHOPAEDIC AND ANKLE SOCIETY & ANKLE-HIND FOOT SCALE AT 1 MONTH
AOFAS 3 MON	AMERICAN ORTHOPAEDIC AND ANKLE SOCIETY & ANKLE-HIND FOOT SCALE AT 3 MONTHS
AOFAS 6 MON	AMERICAN ORTHOPAEDIC AND ANKLE SOCIETY & ANKLE-HIND FOOT SCALE AT 6 MONTHS
• PRE INJECTION FAI	FOOT AND ANKLE OUTCOME INSTRUMENT (FAI) CORE SCALE BEFORE INJECTION
FAI 1 MON	FOOT AND ANKLE OUTCOME INSTRUMENT (FAI) CORE SCALE AT 1 MONTH
FAI 3 MON	FOOT AND ANKLE OUTCOME INSTRUMENT (FAI) CORE SCALE AT 3 MONTH
FAI 6 MON	FOOT AND ANKLE OUTCOME INSTRUMENT (FAI) CORE SCALE AT 6 MONTH
• PREINJECTION PF	PLANTAR FASCIA THICKNESS BEFORE INJECTION
PF 1 MON	PLANTAR FASCIA THICKNESS AT 1 MONTH
PF 3 MON	PLANTAR FASCIA THICKNESS AT 3 MONTHS
PF 6 MON	PLANTAR FASCIA THICKNESS AT 6 MONTHS
NO COMPLICATIONS	NIL

SL NO	UHID NUMBER	GENDER	AGE	BMI	INJECTION PROCEDURE	GROUP	SIDE	COMORBIDITIES	PRE INJECTION VAS	VAS 1MON	VAS 3 MON	VAS 6 MON	ROLES 1 MON	ROLES 3 MON	ROLES 6 MON	PRE INJECTION AOFAS	AOFAS 1 MON	AOFAS 3 MON	AOFAS 6 MON	PRE INJECTION FAI	FAI 1 MON	FAI 3 MON	FAI 6 MON	PRE INJECTION PF	PF 1 MON	PF 3 MON	PF 6 MON	COMPLICATIONS
1	578213	F	53	18.6	P	1	U	NIL	7	6	5	4	F	G	E	65	72	84	92	96	78	56	33	6	5	4	3	NIL
2	456789	M	55	19.4	C	2	B	NIL	8	8	7	5	G	G	F	67	72	76	80	90	76	66	60	6	5	5	5	NIL
3	625132	F	58	23	P	1	U	HTN	8	7	5	4	G	G	E	55	64	76	88	108	90	68	42	7	6	5	4	NIL
4	789023	M	68	19.5	C	2	B	NIL	7	7	6	5	G	F	F	45	56	64	68	102	86	76	72	6	5	5	5	NIL
5	652345	M	62	26	P	1	U	NIL	7	7	5	3	G	E	E	68	76	88	94	95	76	54	37	6	5	5	4	NIL
6	562345	F	42	23	C	2	B	DM	7	6	6	5	F	F	P	65	67	73	78	98	78	66	60	6	5	4	4	INFECTION
7	679023	F	47	21.5	P	1	U	NIL	7	6	4	3	F	G	E	60	79	86	90	105	95	69	45	6	5	4	4	NIL
8	765234	M	58	22.4	C	2	B	NIL	8	7	7	4	F	F	P	56	65	70	74	96	78	68	65	7	5	4	4	NIL
9	678901	M	60	24	P	1	U	HTN	8	6	5	3	F	G	G	56	68	80	96	104	86	57	39	5	5	4	3	NIL
10	523601	F	43	26	C	2	U	NIL	7	7	7	4	F	F	P	50	61	66	70	97	76	65	60	5	5	5	4	INFECTION
11	623891	M	54	25.4	P	1	B	NIL	8	6	4	3	F	E	E	65	71	85	95	92	78	59	38	7	6	5	3	NIL
12	723701	M	38	26.2	C	2	U	NIL	7	6	5	4	G	F	P	48	56	64	68	100	82	76	72	5	5	4	4	NIL
13	723568	F	46	26.4	P	1	U	NIL	7	6	4	4	F	G	G	58	67	79	86	110	89	70	50	6	5	4	3	INFECTION
14	321768	M	39	25	C	2	B	NIL	8	7	5	4	F	F	P	59	64	69	75	107	88	78	75	6	6	5	5	NIL
15	723416	F	51	27	P	1	U	HTN	8	6	4	3	F	E	E	58	70	82	92	96	73	68	47	7	5	4	3	NIL
16	564329	M	43	21	C	2	U	NIL	7	6	5	4	G	F	P	49	58	65	70	99	78	70	65	7	6	6	6	NIL
17	789023	M	60	22.6	P	1	B	NIL	7	7	5	4	F	G	G	64	72	86	95	103	87	63	48	6	5	4	3	NIL
18	678923	F	50	25.5	C	2	U	DM	6	5	5	4	P	P	E	56	65	72	75	96	80	76	71	6	6	6	6	INFECTION
19	765419	M	52	24.2	P	1	U	NIL	7	6	4	4	F	G	E	62	70	81	93	107	86	65	47	6	5	4	3	NIL
20	564378	F	54	27.4	C	2	B	NIL	8	6	5	5	G	P	E	59	66	70	75	99	80	74	68	6	6	6	6	NIL
21	678234	M	57	26	P	1	U	HTN	7	6	5	4	F	E	G	48	58	72	86	97	78	54	33	5	5	4	3	NIL
22	810234	F	58	24	C	2	U	NIL	7	6	5	5	E	P	E	65	71	75	80	102	86	80	76	5	5	5	5	NIL
23	234678	F	53	23.4	P	1	B	NIL	6	5	5	3	G	G	E	64	75	89	96	92	75	58	36	5	5	4	3	NIL
24	478902	F	55	24.2	C	2	U	NIL	8	6	5	5	G	F	E	68	74	80	84	98	72	66	61	7	6	6	6	FAT PAD ATROPHY
25	562370	M	54	25	P	1	B	HTN	7	6	5	3	F	F	G	66	74	88	94	106	89	67	35	5	4	4	3	NIL
26	724100	F	53	23	C	2	U	NIL	7	7	5	5	P	G	F	48	67	72	75	99	86	78	73	6	6	6	6	NIL
27	765490	F	52	24	P	1	B	NIL	7	5	4	4	E	G	E	56	64	76	89	105	83	61	38	5	4	4	3	NIL
28	872345	M	40	22.1	C	2	U	NIL	7	7	5	4	F	G	F	54	66	76	81	107	85	76	72	7	6	6	6	NIL
29	762349	F	61	24.2	P	1	U	DM	8	6	4	4	F	F	E	46	59	73	87	103	85	68	39	6	5	4	3	NIL
30	892345	M	52	21.6	C	2	U	NIL	7	7	5	5	F	G	G	56	67	75	80	99	82	76	70	7	6	5	5	NIL

SL NO	UHID NUMBER	GENDER	AGE	BMI	INJECTION PROCEDURE	GROUP	SIDE	COMORBIDITIES	PRE INJECTION VAS	VAS 1MON	VAS 3 MON	VAS 6 MON	ROLES 1 MON	ROLES 3 MON	ROLES 6 MON	PRE INJECTION AOFAS	AOFAS 1 MON	AOFAS 3 MON	AOFAS 6 MON	PRE INJECTION FAI	FAI 1 MON	FAI 3 MON	FAI 6 MON	PRE INJECTION PF	PF 1 MON	PF 3 MON	PF 6 MON	COMPLICATIONS
31	678234	F	32	18.6	P	1	B	DM	7	6	5	4	E	G	E	67	77	85	91	93	76	66	34	5	4	4	3	NIL
32	563472	F	62	18.7	C	2	U	NIL	7	7	5	5	F	G	G	58	67	76	82	95	80	75	70	7	6	6	6	NIL
33	589342	F	46	22.4	P	1	U	HTN	7	6	5	4	E	E	E	56	68	79	90	99	75	60	32	5	4	4	3	NIL
34	678453	F	51	19.4	C	2	B	NIL	7	6	5	5	F	G	P	55	61	64	71	99	82	77	71	7	6	6	5	NIL
35	768932	M	52	22.3	P	1	U	NIL	8	6	4	4	F	F	E	58	75	83	95	100	79	69	39	5	5	4	3	NIL
36	678234	F	31	20.5	C	2	U	DM	7	6	5	4	G	F	P	65	72	78	82	104	80	74	69	6	6	6	6	INFECTION
37	725678	M	30	24	P	1	B	NIL	7	5	4	4	F	E	G	53	66	78	85	101	81	59	45	5	5	4	3	NIL
38	721490	F	56	22	C	2	U	NIL	7	6	5	5	P	F	P	67	72	79	84	102	82	78	72	7	5	5	5	NIL
39	345890	M	45	18.6	P	1	U	NIL	7	5	4	4	G	G	E	64	72	81	92	104	85	54	44	6	5	4	3	NIL
40	436789	F	40	21.3	C	2	B	NIL	6	6	5	4	P	G	P	46	56	64	72	98	74	68	61	7	5	5	5	SKIN DEPIGMENTATION
41	543678	M	61	26	P	1	U	NIL	7	6	5	4	E	E	G	56	70	82	93	103	86	68	47	6	5	4	3	NIL
42	690723	M	56	24.5	C	2	U	NIL	8	5	5	4	P	F	P	49	57	65	70	96	79	74	69	7	5	5	5	NIL
43	730980	F	43	24	P	1	B	NIL	7	6	4	3	G	G	E	66	77	89	97	94	76	54	48	7	5	4	3	NIL
44	765458	M	64	21	C	2	U	NIL	7	6	5	4	P	F	P	47	55	65	70	99	75	70	65	7	5	5	5	INFECTION
45	562789	F	34	26.7	P	1	U	NIL	8	5	4	3	F	E	E	62	73	84	94	96	78	55	49	6	5	4	3	NIL
46	765455	F	42	25.6	C	2	B	NIL	7	6	5	5	G	F	P	65	70	74	78	100	85	78	74	6	5	5	5	NIL
47	789053	F	43	26.4	P	1	B	DM	7	6	5	3	G	G	E	58	71	86	94	97	77	57	47	7	6	4	3	NIL
48	556879	M	67	28.6	C	2	U	NIL	7	7	5	5	G	F	P	60	64	69	75	104	84	76	70	6	5	5	5	NIL
49	812560	F	28	23.2	P	1	U	NIL	8	5	4	3	E	E	G	65	75	87	96	101	87	58	45	6	5	4	3	NIL
50	346789	M	44	22.4	C	2	B	DM	7	7	6	5	G	F	P	56	60	69	75	100	85	70	65	7	5	5	5	NIL
51	452378	F	31	27.4	P	1	U	NIL	8	5	5	3	F	G	G	60	74	82	97	106	88	56	46	6	5	4	3	NIL
52	546718	M	45	28.3	C	2	U	DM	8	7	6	5	G	F	P	59	65	69	75	96	80	70	68	7	5	5	5	NIL
53	523482	F	32	24	P	1	U	NIL	8	6	5	3	G	E	E	65	76	89	95	102	83	67	49	6	5	4	4	NIL
54	456021	F	54	26.4	C	2	U	NIL	8	7	6	5	E	F	P	56	63	72	79	99	84	75	73	6	5	5	5	NIL
55	678333	F	58	25.4	P	1	U	NIL	6	6	5	3	P	F	E	66	78	90	96	98	76	61	43	5	5	4	3	INFECTION
56	389002	M	45	26	C	2	U	DM	8	7	6	4	E	F	P	67	71	79	84	94	80	78	72	6	5	5	5	NIL
57	732456	F	48	23.1	P	1	U	NIL	8	6	4	3	P	F	E	62	75	86	94	94	75	60	42	7	5	4	4	NIL
58	378923	F	36	24.2	C	2	U	DM,HTN	7	7	6	4	E	F	P	48	52	64	70	106	76	70	67	6	5	5	5	NIL
59	823456	M	50	25.6	P	1	U	NIL	7	6	4	3	F	G	E	60	73	87	95	109	84	67	41	5	5	4	4	NIL
60	345902	F	36	24.1	C	2	U	NIL	8	8	6	4	E	F	P	48	56	63	70	110	84	75	68	6	5	5	5	NIL

SL NO	UHID NUMBER	GENDER	AGE	BMI	INJECTION PROCEDURE	GROUP	SIDE	COMORBIDITIES	PRE INJECTION VAS	VAS 1MON	VAS 3 MON	VAS 6 MON	ROLES 1 MON	ROLES 3 MON	ROLES 6 MON	PRE INJECTION AOFAS	AOFAS 1 MON	AOFAS 3 MON	AOFAS 6 MON	PRE INJECTION FAI	FAI 1 MON	FAI 3 MON	FAI 6 MON	PRE INJECTION PF	PF 1 MON	PF 3 MON	PF 6 MON	COMPLICATIONS
61	321789	F	40	26.3	P	1	U	NIL	7	6	4	3	E	E	E	58	69	78	86	104	89	68	46	7	5	4	3	NIL
62	723481	F	60	27	C	2	U	NIL	7	6	6	4	E	F	P	60	67	72	78	108	84	76	65	7	5	5	5	NIL
63	452389	F	68	28.2	P	1	U	NIL	8	6	5	3	G	F	G	62	75	88	94	96	70	50	35	6	5	4	4	NIL
64	543217	M	65	27.2	C	2	U	HTN	7	6	5	4	G	F	F	54	59	67	73	99	86	78	70	7	6	5	5	NIL
65	723459	F	34	23.7	P	1	U	NIL	8	7	4	3	E	E	E	60	72	83	95	98	76	55	37	6	5	4	4	NIL
66	678421	M	54	26	C	2	U	HTN	7	6	6	5	G	P	F	58	64	73	78	107	80	74	68	5	5	5	5	SKIN DEPIGMENTATION
67	569023	F	47	25.4	P	1	U	NIL	8	7	5	3	F	G	G	46	59	67	82	102	86	68	39	7	5	4	4	NIL
68	765342	M	32	24.2	C	2	U	NIL	7	5	5	4	E	P	F	62	69	78	84	97	75	68	64	6	5	5	5	NIL
69	678934	F	30	21.6	P	1	U	NIL	7	5	4	3	E	E	E	55	60	73	86	110	88	66	47	6	5	4	3	NIL
70	653231	M	54	23.7	C	2	B	NIL	8	8	7	5	E	P	P	60	65	74	79	96	80	70	66	7	5	5	5	NIL
71	654789	F	66	24.5	P	1	U	NIL	7	6	5	3	G	G	G	68	72	83	96	98	75	69	49	7	5	4	3	NIL
72	672345	F	40	23	C	2	U	NIL	7	5	5	4	E	P	P	50	58	69	75	95	76	69	67	7	5	5	5	NIL
73	723456	M	38	19.2	P	1	U	NIL	7	5	4	3	G	E	E	58	72	85	95	97	76	67	48	6	5	4	3	NIL
74	789034	F	42	19.5	C	2	U	NIL	7	6	5	4	E	P	P	47	56	67	73	98	80	72	66	5	5	5	5	NIL
75	765420	F	26	28.4	P	1	U	NIL	8	6	4	4	E	E	G	64	77	89	96	93	75	60	43	7	5	4	3	NIL
76	801234	F	58	20	C	2	U	NIL	7	6	6	4	E	P	P	49	57	67	73	98	84	78	72	6	5	5	5	NIL
77	562341	M	52	24.1	P	1	U	DM	7	5	5	3	F	F	P	57	68	75	87	106	87	66	48	6	5	4	3	NIL
78	673451	F	33	23.5	C	2	U	NIL	7	7	6	4	E	G	P	59	65	74	80	99	86	76	68	7	5	5	5	NIL
79	641823	F	45	23.5	P	1	U	DM,HTN	7	5	4	3	E	E	E	50	63	77	89	103	85	60	40	7	5	4	3	NIL
80	721780	M	40	28.7	C	2	U	NIL	7	6	6	5	G	G	P	68	74	79	82	100	75	68	62	6	6	5	5	NIL
81	712001	F	65	25.5	P	1	U	NIL	8	5	5	3	G	G	E	66	75	86	95	93	78	57	38	7	5	4	3	NIL
82	654200	F	56	17.6	C	2	U	DM	8	7	6	4	E	F	P	65	71	77	82	95	70	68	64	7	6	5	5	NIL
83	523671	F	64	24	P	1	U	NIL	7	5	4	3	G	E	E	46	57	70	87	96	78	55	37	6	5	4	3	NIL
84	623421	M	62	23.7	C	2	U	DM	7	6	6	4	E	G	P	62	69	78	80	102	83	76	70	5	5	5	5	NIL
85	786541	F	68	21	P	1	U	NIL	8	5	5	3	F	F	P	67	78	84	91	103	87	65	35	7	5	4	3	NIL
86	767891	M	32	22.1	C	2	U	HTN	6	5	5	4	G	G	P	64	69	75	78	105	85	77	71	6	5	5	5	NIL
87	623451	F	50	25	P	1	U	NIL	7	5	4	4	G	G	E	65	72	80	90	107	89	68	36	6	5	4	3	NIL
88	451234	F	48	22	C	2	U	DM	7	7	6	4	G	F	P	62	69	76	80	97	80	75	68	7	5	5	4	NIL
89	452678	F	30	24.2	P	1	U	NIL	8	5	4	4	G	G	E	68	76	85	97	99	76	53	37	7	5	4	4	NIL
90	564238	M	46	21.2	C	2	U	HTN	7	7	6	4	E	F	P	68	74	80	84	102	75	70	64	5	5	5	5	NIL

SL NO	UHID NUMBER	GENDER	AGE	BMI	INJECTION PROCEDURE	GROUP	SIDE	COMORBIDITIES	PRE INJECTION VAS	VAS 1MON	VAS 3 MON	VAS 6 MON	ROLES 1 MON	ROLES 3 MON	ROLES 6 MON	PRE INJECTION AOFAS	AOFAS 1 MON	AOFAS 3 MON	AOFAS 6 MON	PRE INJECTION FAI	FAI 1 MON	FAI 3 MON	FAI 6 MON	PRE INJECTION PF	PF 1 MON	PF 3 MON	PF 6 MON	COMPLICATIONS
91	569082	F	42	24.7	P	1	U	DM,HTN	7	5	5	5	F	P	P	64	78	87	96	100	89	68	36	5	5	4	4	NIL
92	543200	F	36	23	C	2	U	NIL	7	6	6	5	E	P	E	46	56	65	69	104	80	73	67	6	5	5	5	FAT PAD ATROPHY
93	789340	M	34	19	P	1	U	DM	8	7	5	5	G	F	E	66	75	88	94	110	90	69	38	5	5	4	4	NIL
94	767892	F	45	19.2	C	2	U	NIL	8	8	7	4	E	P	P	44	56	60	64	109	84	78	71	6	5	5	5	NIL
95	432678	M	32	27.6	P	1	U	DM	7	6	5	4	P	F	P	60	74	85	92	96	70	56	37	5	5	4	3	NIL
96	567892	F	34	23	C	2	U	HTN	8	8	7	5	G	P	E	48	57	67	74	97	80	74	67	7	5	5	5	NIL
97	452367	M	27	28	P	1	U	NIL	7	7	5	4	G	G	E	50	69	79	89	98	72	58	35	7	4	4	3	NIL
98	723456	F	44	23.5	C	2	U	NIL	7	6	6	4	F	P	F	58	65	70	74	102	87	75	68	6	5	5	5	SKIN DEPIGMENTATION
99	582345	M	26	26.4	P	1	U	NIL	6	5	5	5	P	F	P	40	57	75	88	104	87	67	36	6	5	4	3	NIL
100	627890	M	67	27.4	C	2	U	NIL	8	6	6	5	F	P	F	56	68	76	74	106	89	76	68	7	5	5	5	NIL